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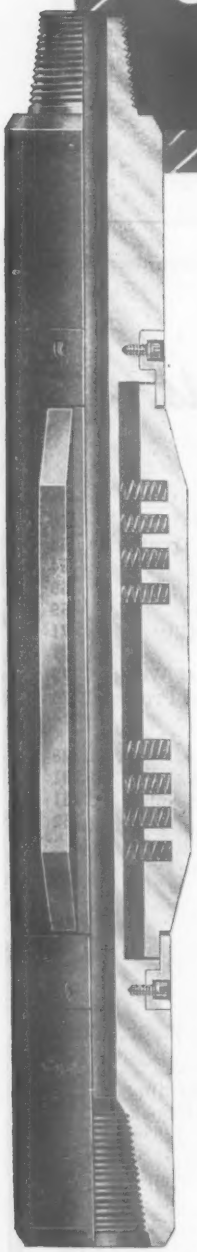
CASING SHOULD BE SCRAPED WHILE THE RIG IS UP



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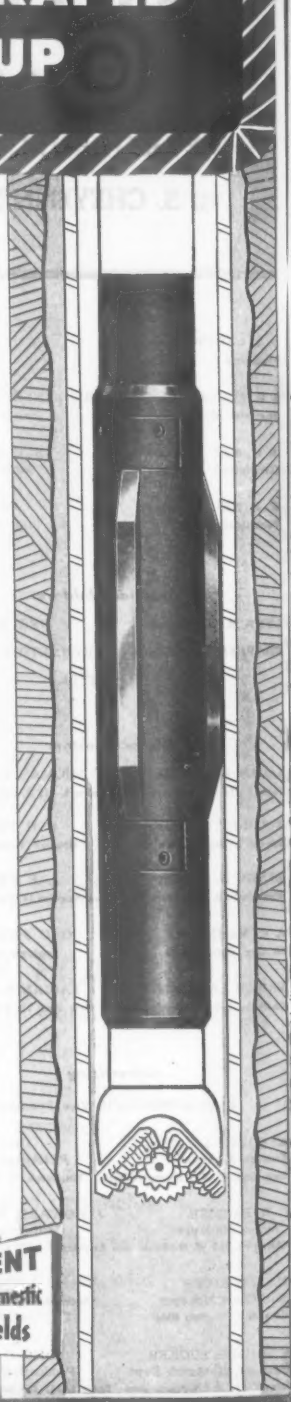

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Trends

Crude-Oil Production
By States—Page 136

CRUDE-OIL STOCKS 211,862,000 bbl. as of Sept. 1—up 49,000 bbl. One year ago 223,482,000 bbl.

GASOLINE STOCKS 84,218,000 bbl. as of Sept. 1—down 475,000 bbl. One year ago 78,362,000 bbl.

RESIDUAL FUEL-OIL STOCKS 46,807,000 bbl. as of Sept. 1—up 606,000 bbl. One year ago 59,872,000 bbl.

GAS OIL AND DISTILLATE STOCKS 40,859,000 bbl. as of Sept. 1—up 1,077,000 bbl. One year ago 40,754,000 bbl.

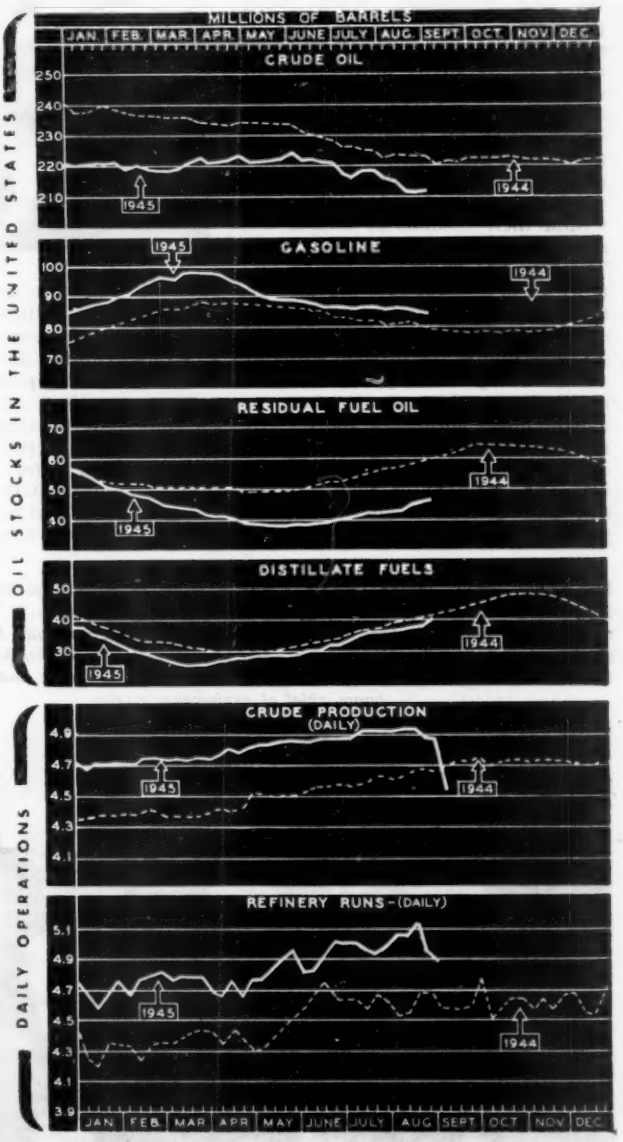
CRUDE-OIL PRODUCTION 4,525,750 bbl. as of Sept. 8—down 346,300 bbl. One year ago 4,696,800 bbl.

REFINERY RUNS 4,685,000 bbl. daily week ended Sept. 1—up 246,000 bbl. One year ago 4,595,000 bbl.

APPOINTMENT of an interagency policy-making committee in Washington last week to deal with the synthetic-rubber problem inspires hope that this byproduct of the petroleum industry will receive the attention it deserves. It is too early to judge what influence will be exerted beyond the fundamental laws of economics, quality, supply and demand. It is probable that international politics, world economics, and other extraneous issues will exert pressure far beyond reason. British interests, because of their investments in natural-rubber properties in the Malayan peninsula, are chiefly concerned outside the United States companies, which operate $700,000,000 worth of Government-owned synthetic-rubber plants.

CREATION of a formal committee for careful analysis of all factors of rubber production and consumption is a step in the right direction. It indicates that the synthetic industry in this country, now capable of producing 1,000,000 tons of rubber annually, will not decay solely because no one considered it as a peacetime asset. Costs of synthetic-rubber production from petroleum hydrocarbons are lower than the prewar cost of natural rubber. Plants built under the extreme urgency of war were expensive, but no blame attaches to the process of the plant operators. It follows that petroleum refiners and the companies producing synthetic rubber from alcohol must be given the opportunity of purchasing manufacturing facilities on a basis competitive with peacetime costs if private industry is to become established in this field.

THE interagency committee is headed by William L. Batt, vice chairman of the War Production Board. Representatives from the State, War and Navy departments, the Surplus Property Board, Reconstruction Finance Corp., and Foreign Economic Administration will serve under Batt. "It is essential," said Reconversion Director John W. Snyder in announcing the committee, "that such a policy provide for an adequate supply of rubber . . . to satisfy the strategic requirements of the United States." Given the opportunity to acquire plants at a reasonable price and granted encouragement for research and development, the oil refiners can assure this country that never again will it be sent to its knees for lack of rubber.



XUM

South American Exploration Activity in Full Swing, Journal Representative Finds

by Kenneth J. Langley

THE outstanding impression left by a trip to South American oil areas is the need for American oil equipment. In most countries equipment is needed for expansion programs that are on the must list, regardless of any postwar unsettlement.

The second most vivid impression is the tempo of the exploration campaign for new oil fields. In Colombia and Venezuela, where large production already exists, this is partly due to concession-expiration dates, partly to the influx of new companies desiring to bolster their crude-reserve position. In other South American countries it is the result of a desire on the part of the governments to see the development of this important natural resource within their boundaries and to exploit its possibilities to the utmost. The war has impressed the importance of petroleum very forcibly on the governments and people of all countries in South America.

Consequently there seems to be in almost every country, a sense of urgency, a working against time, to expand oil-exploration activities. All in all, the visitor gets the impression of an exploration program of such size and momentum that nothing can stop it within the next few years.

Kenneth J. Langley, eastern manager for The Oil and Gas Journal, recently returned from a trip of 21,550 miles by air, boat, rail, and automobile (see map) in which he visited eight South American countries, in addition to the islands of Aruba, Curacao, and Trinidad. In the accompanying article, he presents the highlights of his impressions of the current petroleum situation in the countries he visited, which included Colombia, Venezuela, Brazil, Uruguay, Argentina, Bolivia, Peru, and Ecuador. The trip consumed 3½ months. Langley's report includes data on drilling, production, refining, and transportation, with emphasis on plans under way for converting to peacetime economy. For convenience, each country is considered separately, following a general summary.

Along with this exploration expansion, goes a substantial pipe-line construction program, expansion of natural - gasoline, pressure - maintenance, or cycling plants, new refinery construction, or complete rebuilding and modernization of old refineries, plus repair, replacement, modernization, and expansion of marketing and distribution facilities.

Finally, and tied in with the first impression, a newcomer is awed at the manner in which old equipment has been patched, repaired with makeshift replacement parts, and of necessity forced to serve beyond any limits ever intended by the manufacturer. It exists even to some extent in Venezuela, which for military reasons, had first call during the war on equipment available for export to South America. What it is like in Argentina, which was at the foot of the military priority list, can only be appreciated by actually seeing some of the equipment in use in the fields.

Highlights of observations covering petroleum operations in South America by countries follow.

The author (sitting, second from left) with a group of officials of Yacimientos Petrolíferos Fiscales, Comodoro Rivadavia, Chubut, Argentina. Sitting: S. Merlini, accountant; Langley; Emilio Montané, administrator; Abelardo Díaz Soto, and Adolfo Pacagnini, chief engineer. Standing: Jesús Iniigo, chief of technical service; Dr. Altavino Catanari, chief geologist; Rolando Ernesto Peters, chief petroleum engineer, and Israel J. Teitelbaum, chief of exploration service

Colombia

This country has three producing regions, producing about 65,000-70,000 bbl. daily from about 1,400 wells. All fields are connected to either Covenas or Cartagena, ports on the Carribean, by pipe line. The Barco region is near the Venezuelan border; the Demares and Casabe are in the Middle Magdalena Valley, production being about 17,000 bbl., 45,000 bbl., and 8,500 bbl. respectively.

There are about 16 wildcat wells drilling, and the number will be at least doubled as rapidly as drilling equipment can be delivered.

Here the feeling of urgency is most evident of all places in South

America. The reason is that concessions are nearing expiration, plus entry of new companies seeking to establish new reserves quickly.

While the current production is coming from the three areas named, Shell has recently discovered high-gravity oil (42° or better) in the Lower Magdalena Valley at El Dificil. The major interest for the future however, seems to be in the plains region east of the Andes Mountains, despite its remoteness and transportation difficulties. Unconfirmed reports that a Shell wildcat, 2 San Martin, had struck oil in this territory have naturally intensified this interest.

Venezuela

Whether they talk about production, reserves, or acreage held under concession, in Venezuela they use big numbers. Total production had reached about 960,000 bbl. per day when the war ended, divided about two-thirds in the west or Lake Maracaibo region and one-third in Eastern Venezuela.

The Government reports that at the beginning of 1945, there were over 22 million acres under concession. More than 7½ million acres of this total was granted during 1944. Here again is evidence of a country in which activity is just getting under way.

Possibilities in the lake region have certainly not been exhausted, or possibly even reached a stage of maturity, since areas from 9 to 12 miles out in the lake are considered favorable for ultimate development. Yet the greatest interest is in Eastern Venezuela, which at present has only about one-third of the total production.

Although it has 25 producing fields, yielding around 300,000 bbl. daily, Eastern Venezuela is only in a very early stage of development, and not much past that period in exploration. Concessions have been sought so extensively that the portions close to the coast have almost been blanketed, and concession-seeking activity is moving steadily inland.

Three new refinery projects have been officially announced, each to be of 40,000 to 50,000 bbl. capacity, one at Puerto La Cruz in Eastern Venezuela, one on the coast at Turiamo, between Puerto La Cruz and Lake Maracaibo, and one in Northern Venezuela, at Punta Cardon, on the Paraguna Peninsula. A fourth plant of similar size is definitely assured.

Aruba and Curacao

Two huge refineries of 300,000 and 250,000 bbl. capacity, utilizing Venezuelan and Colombian crude, contributed heavily during the war to the cause of the United Nations, but censorship restrictions prevailing during the writer's visit limited efforts to obtain information.

However, it was obvious that salt-water corrosion, where sea water is used directly for cooling, plus sulfur corrosion from sour crudes, will necessitate the replacement of substantial amounts of equipment as soon as it can be obtained. Corrosion probably results in 50 per cent reduction in the operating life, compared to normal U. S. expectancy, of such items as heat exchangers, pipe, valves, boiler and shell tubes, and hundreds of other items.

Trinidad

Total production is about 60,000 bbl. daily from approximately 7,000 wells, balanced against two important refining units, of about 75,000 bbl. capacity, one a 20,000-bbl. plant, the other about 55,000 bbl. A 10,000-bbl. fluid catalytic cracking plant is planned. Crude is imported from Venezuela to make up the deficit between local production and refining capacity.

Future production prospects are considered favorable in the Gulf of Paria, which will require marine-drilling-barge equipment. There are also favorable indications in the south and southwest.

Brazil

Since 1937 production and refining of petroleum in Brazil have been a Government monopoly. There is some talk of changing the laws to permit government-foreign capital partnership. A government exploration campaign dating back to 1918 has resulted in the discovery of oil in the State of Bahia, where four fields now produce about 800 bbl. daily from 23 wells.

There are five small refineries in the country, with a combined capacity of slightly under 2,000 bbl. daily. One of these, a 500-bbl. plant in Yparanga, State of Rio Grande do Sul, is now being enlarged by addi-

Route followed by author in visiting oil areas of South America

View of main camp of Y.P.F. at Kilometer 3, Comodoro Rivadavia, Chubut, Argentina

tion of a 2,000-bbl. combination unit, under construction by the Foster-Wheeler Corp.

Uruguay

Uruguay has no production and the director of the Geological Institute does not think prospects are favorable. However, the institute owns 16 spudders and core-drill rigs, which are used for developing geological information and drilling water wells in the interior. It is now in the market for 20 more rigs.

The Government operates a 6,000-bbl. refinery at Montevideo, which supplies most of the country's requirements. Designed for sweet crude from Peru and Ecuador, the plant has been processing sour crude from Venezuela during the war, and the resultant corrosion will necessitate some replacements.

Argentina

There are four producing regions in Argentina, making about 64,000 bbl. daily from about 4,100 wells. These are Commodoro Rivadavia, some 46,000 bbl. from 3,300 wells; Mendoza, about 8,300 bbl. from 100 wells; Plaza Huincul, about 6,000 bbl. from 400 odd wells; and Salta with about 3,700 bbl. from about 250 wells. The Government-owned and operated company, Yacimientos Petroliferos Fiscales (Y.P.F.) has about two-thirds of the production, and four private companies divide the remainder. For several years the private companies have found it practically impossible to expand their operating area under the laws and regulations. In effect their only way to expand production is by deeper drilling on properties already owned. Y.P.F., on the other hand, has discovered during the war a new area about 45 miles south of Commodoro Rivadavia, near Caleta Olivia, that has the earmarks of a substantial reservoir.

Crude at Commodoro Rivadavia has an outlet through two privately owned refineries and via short pipe lines to coastal terminals at Caleta Cordoba. Mendoza crude has a partial outlet through a local refinery; the remainder is shipped via rail to the Buenos Aires refineries. At Plaza Huincul, some crude is refined locally, the remainder shipped via rail to Buenos Aires. Salta crude has some outlet through a local refinery; the remainder reaches ports on the Parana River by rail, thence via river to the Buenos Aires area. About 300 bbl. per day of Bolivian crude is imported through Standard's pipe line and refined by Y.P.F. in its plant at Chapapoyas.

For a crude supply of 64,000 bbl. daily, the country is equipped with 19 refineries having a total capacity of about 100,000 bbl. Since the country is extremely short of fuel, imports will be resumed as soon as tankers are available.

Paraguay

This country has no production, but Union Oil Co. of California has a 54-million-acre concession in the Chaco. The company has an office in Asuncion, and is carrying on a geophysical exploration program which started in 1944.

Bolivia

Since 1937, when the Government and Standard Oil Co. of Bolivia disagreed about rentals and royalties and the Government expropriated the company's properties, paying $1,750,000 compensation, all operations in Bolivia have been by the Government. Six oil fields have been found, with only three in operation, Bermejo producing about 350 bbl. from four wells, Sanandita with 300 bbl. from ten operating wells out of 17 producers, and Saipuru with 300 bbl. from three operating wells out of seven producers.

Lack of transportation between producing areas and consuming centers has handicapped operations. Postwar plans call for pipe line and refinery construction, plus expansion of production, and Government loans in the U. S. have assured the financing of these plans.

Peru

Peru is the only country with large crude production on the west coast of South America and therefore has a potential market extending from Panama to Chile. Production totals about 40,000 bbl. daily, with about 33,000 bbl. coming from the La Brea-Parinas concession and 6,500 bbl. from the Lobitos concession. These two concessions are on privately owned land and operated by private companies. The remaining 500 bbl. is divided between the Government-owned company's operations in the Zorritos and Los Organos fields, and the privately owned Ganso Azul operations in the Agua Caliente field on the eastern side of the Andes Mountains.

Granting of new concessions for oil exploration was suspended last year by the Government, due to several factors, principally the war. The main fields are unaffected, since the La Brea-Parinas concession, covering some 600 sq. miles is on privately owned land; as is also the Lobitos concession, covering about 200 sq. miles.

Most interest for the long-range future lies in the Montana region, on the eastern side of the Andes Mountains, but transportation problems will be enormous, since pipe lines would have to cross the Andes at very high elevations to bring any oil found to the coast.

There is a substantial program of equipment replacement and additions by the private companies ready for postwar activity. Among other things, International is planning a complete modernization of its camps, including housing accommodations for its workers.

Ecuador

Production of about 7,500 bbl. daily is all obtained from fields in the Santa Elena Peninsula, which lies north across the Gulf of Guyaquil from the fields of Peru. There are an estimated 900 producing wells, with about 11 rigs operating. Production is all by private companies, American, British, French, and local capital.

Concessions are available for exploration, but there is not much activity at present, possibly due to lack of equipment. The coastal fringe is pretty well covered with concessions. Shell has a concession of about 25 million acres in the eastern plains area across the Andes Mountains, and is now drilling a wildcat test there. Every piece of equipment and supplies, as well as all the personnel, had to be flown in by plane.

THIS WEEK

READY— FPC and industry leaders set for natural-gas investigation opening at Kansas City September 18. . . . Lawyers, engineers, economists to testify. . . . Some sections of industry view probe with suspicion. . . . FPC insists simply seeks facts on which to base policies. . . . Clash over state rights likely to emit sparks. . . . ¶Ickes, Davies, Rayner, accompanied by technical advisers, off for London conference on Anglo-American oil agreement, opening September 17. . . . Hope to gain British acceptance American revision of original pact, signed last year, but ratified by neither government. . . .

PRODUCTION— Nation's crude output registers another drop. . . . Daily average for week, 4,525,750 bbl. . . . Down 346,300. . . . Texas accounted for 333,200, with every area of state disclosing loss except Panhandle. . . . Kansas, Louisiana, eastern area down. . . . Only noteworthy increases Illinois, New Mexico. . . . ¶Week's completions 557, up 81. . . . ¶Abrupt cancellation by Government of buying orders for 75,000 bbl. West Texas and 50,000 Southwest Texas crude daily foreshadows another sharp cut in production. . . . Industry leaders warn that alternative is accumulation of excessive stocks. . . . Government's action before Navy had made enough tankers available for water movement deprives the two areas of market and adds to confusion. . . .

PIPE LINES— Navy discloses virtual completion of $20,000,000 pipe line across Isthmus Panama. . . . Duplicate of one finished in 1943 to insure fuel supplies for Pacific fleet in event of enemy cutting canal. . . . Would relieve peacetime canal traffic. . . . ¶Pipe bought for Iraq Petroleum 16-in. line from Kirkuk, Iraq, to Haifa, Jerusalem. . . . Deliver oil from rich fields of Middle East to Mediterranean. . . . ¶France negotiating for all oil pipe lines laid by U. S. Army across France to Rhine. . . . ¶Russia's first "big inch" natural-gas line, Saratov to Moscow, to be equipped with 36 American compressors . . .

WASHINGTON— Senator Moore demands immediate removal controls on oil and products and end of subsidy payments. . . . ¶Senator Thomas warns: "These bureaucrats want to hold onto their jobs." . . . ¶War blackout on government oil statistics lifted. . . . Demand for crude and products, figures on imports and exports available first time since war. . . . ¶ODT control over shipment all liquid products, including oil, by rail, truck, pipe line ends September 30. . . . ¶PAW's aviation-gasoline reimbursement program ends September 30. . . . Protects refiners against loss in event of specification changes. . . . Aviation-gasoline contracts already terminated. . . .

OPTIMISM— Indiana Standard building great new laboratories. . . . Sees immense expansion of research activities. . . . Project will take care of many returning veterans. . . . ¶Postwar motor fuel better than octane numbers indicate. . . . Some practices in evaluating gasoline now outmoded. . . . ¶Industry will employ 10 per cent more persons within a year than it did before war and provide 150,000 more jobs within 2 years, A.P.I. president says. . . . Predicts better gasoline too, and more of it. . . . ¶More than 100 refineries still making 100-octane gasoline. . . . Future output depends on individual plant and their relation to the military. . . .

INTERNATIONAL— Exclusive oil concession covering Ethiopian empire granted Sinclair. . . . Besides royalties, Sinclair to establish schools, hospitals, clinics, research foundations, educational program. . . . ¶Oil exports first half of 1945 more than twice as much as imports. . . .

Scars of war remain in this oil refinery in the Tokyo area. Facilities are completely shattered and the surrounding ground pitted with bomb craters. Superforts blasted the Jap mainland in 5 months of concentrated attacks prior to Japan's surrender

Official USAAF photo from Acme

XUM

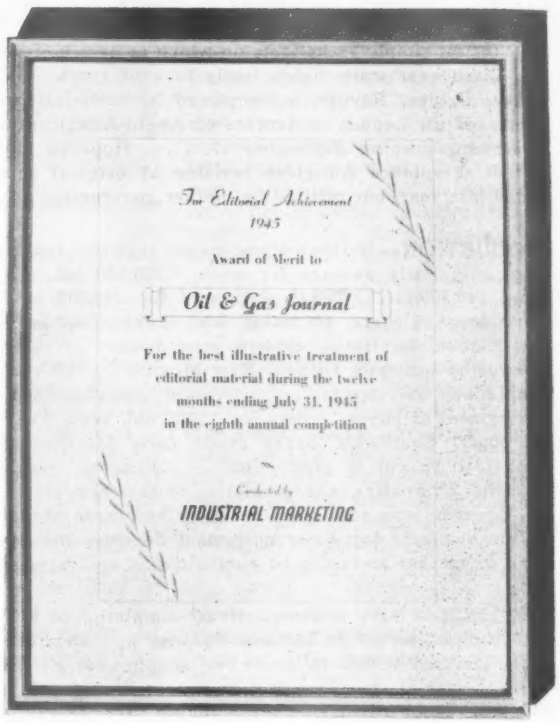
Journal Wins Editorial Contest Award for "Best Illustrative Treatment of Material"

CHICAGO.—The Oil and Gas Journal was among a select few of the country's industrial publications to receive awards here September 10 in a national contest for editorial achievement. Representatives of the Journal were called to Chicago to accept an award "for the best illustrative treatment of editorial material," facsimilie of which accompanies this report.

The Journal's entry in the national contest consisted of the four multicolor sections appearing in the Postwar Number, November 18, 1944; the International Issue, December 30, 1944; the Annual Number, January 27, 1945, and the Refinery Issue, March 31, 1945.

The winning sections set a new standard in the petroleum-trade publication field. Multicolor charts and graphs were used unstintingly in conveying the pertinent data and developments to Journal readers in such manner that a glance saved reading hundreds of words of explanatory text.

The national contest in which the Journal was judged winner of one of the top awards was sponsored by Industrial Marketing, Chicago, a publication devoted to business advertising. The entries were judged by a panel of top advertising men and an expert on typography. They were G. B. Cushing, manager, sales promotion, A. M. Byers Co.; J. L. Austin, advertising manager, Pittsburgh Equitable Meter Co.; D. Clinton Grove, assistant to executive vice president, Blaw-Knox Co.; George Ketchum, president, Ketchum, MacLeod & Grove, Inc.; H. P. Vieth, account executive, Batten, Barton, Dustrine & Osborn, Inc.; V. H. McClure, president, W. S. Hill Co., and Edwin H. Stuart, president, Edwin H. Stuart, Inc., typographers, all of Pittsburgh.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INDUSTRIAL MARKETING

Chicago Corp. Sells Its Interest in T. G. & T.

NEW YORK.—Chicago Corp. has sold its interest in Tennessee Gas & Transmission Corp. to a group headed by Stone & Webster for $10,500,000. The announced reason for the sale was to avoid the possibility of Chicago Corp. being classified as a natural-gas company by Federal Power Commission, thus interfering perhaps with its operations as an investment company. Tennessee's 1,265-mile Texas-to-West Virginia pipe line was financed by Chicago Corp.

Liquid-Transport Division Discontinued by ODT

WASHINGTON. — The liquid-transport department of Office of Defense Transportation, which directed and coordinated the wartime flow of petroleum, its products, chemicals and other bulk liquids, has been discontinued. The action, effective September 20, applies to all shippers of liquid products in railway tank cars, highway tank trucks and by pipe-line transportation.

In a letter of notification Porter L. Howard, director of the ODT liquid-transport department, and A. V. Bourque, S. F. Niness and R. W. Shields, directors respectively of the tank-car, tank-truck and pipe-line divisions, commended shippers of liquid products for their "wholehearted cooperation, the consideration of our problems which you have so unstintingly given us, and the important part you have played in winning the war."

A. P. I. Plans to Resume Meetings Next November

NEW YORK.—The silver jubilee meeting of American Petroleum Institute has been scheduled tentatively for November 12-15 at the Stevens Hotel, Chicago. At the headquarters of the institute it was emphasized that this tentatively scheduled twenty-fifth anniversary meeting—which becomes also a victory celebration meeting—would be devoted largely to studies of new employment, new markets, and the new technologies of the petroleum and natural-gas industries.

The last meeting of the institute was held in Chicago in 1942. There were more than 2,500 registrations at the convention, with fewer visitors from overseas than usual owing to increasingly serious travel conditions attending the war then under way. Manpower shortages beginning to be felt in this country affected attendance, too.

This year's meeting of the institute probably will set a new high attendance record because of the desire by members to hear discussions of the technical advances during the war and to resume normal relationships with hundreds of operators and equipment suppliers who have been denied the privilege of exchanging experiences and ideas since institute annual meetings were suspended.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Why Go Back?

SCATTERED signs are appearing that the oil industry may slip back into some prewar practices subversive to the interests of all concerned. Ills resulting from overexpansion of marketing facilities were cured during the war. It would be tragic if they were allowed to return in aggravated form.

No strain on the memory is necessary to recall that period in the thirties when the owner of a corner lot on almost any important thoroughfare was in clover. He had only to tabulate the offers pressed into his hand by importunate gasoline retailers ready to pay astronomic figures for a station site.

Stations multiplied. Savage competition ensued. Then came the war, with rationing of motor fuel, shortage of manpower, and disappearance of thousands of automobiles from the highways. "Closed" signs were displayed throughout the country at stations which had cost small fortunes.

But reports are at hand of the old scramble for gallonage again prompting fantastic prices for service-station locations. An unhealthy symptom at best, and possibly prophetic of a return to the mischievous conditions which plagued the oil industry in prewar years.

Healthy competition is to be encouraged, but not prodigality. A case recently reported is in point. Company A appraised an undeveloped marketing site and submitted a reasonable bid. Company B offered two and a half times as much—and of course got the property. How could a property worth $20,000 to one experienced oil-marketing concern be worth $50,000 to a direct competitor?

The marketing division of the oil industry has borne the ignominy of being its weakest. Sheer volume helped to gloss over unsatisfactory returns from sales. In peacetime the thirst for gallonage was almost insatiable. Outrageously high prices paid for service-station sites were justified on the basis of increased gallonage. Unprofitable operation was the common result. Deficits were charged against those outlets returning a profit or against other divisions of the industry in the case of integrated companies.

The war has afforded the industry an opportunity to make a fresh start. Many unprofitable and duplicative stations were war casualties. It would be well if these cats and dogs of the petroleum-distribution systems were left sleeping. Why deliberately revive old troubles?

Rising wages and continuing high costs make it more imperative than ever that all divisions of the oil industry contribute a proportionate share to earnings. The most efficient and lowest-cost refinery marketing operation in the world could be destroyed by inefficient and excessively expensive marketing of its products. The same sort of statement could be made substituting production and transportation for refining.

Responsibility for preventing return of malpractices in the marketing end of the business rests with top management. Eagerness for gallonage must be tempered with sound judgment on the economics involved. Clean, efficient, and adequate service stations do not need to be ornate. Nor is it necessary to pack them four to the corner. The industry can serve without being stupid, and the public will welcome renewed emphasis on "service" with less attention to "facilities."

XUM

INTERNATIONAL

Ethiopian Empire Grants Concession to Sinclair

NEW YORK. — An exclusive oil concession, embracing the 350,000 square miles of the Ethiopian empire, has been granted to Sinclair Oil Corp. by Emperor Haile Selassie. Under the terms of the concession all petroleum development rights for the entire country—equal in size to Texas and Oklahoma combined, with Massachusetts and Rhode Island thrown in—will rest with Sinclair for 5 years. Then 50 per cent of the area will be released. After a further exploratory period of 5 years 25 per cent more of the area will be released. The remainder will be under the terms of the concession for a total of 50 years.

In addition to royalties to be paid to the emperor, Sinclair is to build schools, hospitals, clinics, and research foundations. The company also will finance an educational program for Ethiopians in the United States during the first 10 years.

In 1935, Haile Selassie deeded more than half his empire for exploration and development by Anglo-American oil interests. At that time he acted in the vain hope that this would halt an expected Italian invasion.

The concession just signed by Sinclair comes almost on the eve of a meeting of foreign ministers in London, at which the question of Italy's one-time foreign empire may be discussed. Ethiopia is entirely cut off from the Red Sea and Indian Ocean by Italian Eritrea and French, British and Italian Somililand.

The company agrees to build a refinery in Ethiopia as justified by consumption of the country and if economically sound.

Ethiopia subjects are given subscription preference to at least 20 per cent of any issue of shares in the event of the creation of a subsidiary company solely assuming performance of the agreement.

The Ethiopian government is entitled to royalty payments on a stipulated basis for the first 5 years and thereafter at an increased rate subject to revision in 15 years from the beginning of production.

Pressure-Maintenance Plant Under Construction

Construction of a pressure-maintenance and absorption plant has been started by Compania Consolidada de Petroleo, operating subsidiary of Venezuelan Petroleum Co., in the state of Monagas, Venezuela. The plant, designed to serve the company's Muri and Santa Barbara fields, will not only process the gas produced in them and return dry gas to the producing formations, but will stabilize crude, top a certain quantity of motor fuel from the crude, and generate electric power for the plant and camp. It is expected the plant will be completed by mid-January 1946.

Natural gas produced with the crude will be piped from separators to the plant at a pressure of approximately 50 psi. where it will enter scrubbing tanks to remove liquids and foreign matter. From the scrubbers the gas will pass through three stages of compression which will increase its pressure to approximately 2,200 to 2,500 psi. at which pressure it will be returned to the formation through input wells. The gas plant will consist of seven 600-hp. gas-engine compressor units having a total daily compressor capacity in excess of 18,000,000 cu. ft. of gas.

Between the first and second compression stages the gas, after being cooled, will pass through an absorption tower having a daily processing capacity of approximately 25,000,000 cu. ft., in which the recoverable hydrocarbons will be extracted. After its second compression the gas will be cooled in a high-pressure dehydrator to free from humidity before its final compression to approximately 2,200 to 2,500 psi., at which pressure it will be returned to the formation.

The crude oil will be stabilized in special separator tanks, and such gases as are freed in this operation will be mixed with the natural gas entering the absorption plant, to be treated with the gas. The daily capacity of the crude stabilization unit will be approximately 60,000 bbl.

The absorbent medium used will be circulated in the absorption tower and distillation system and upon leaving the tower charged with the absorbed hydrocarbons, will pass through thermic recuperators and preheaters to a flash tower in which the lighter hydrocarbons will be separated. The rest of the absorbent will pass through a vertical still to separate the remaining hydrocarbons, the absorbing medium being thereby reduced to its original state to be recycled.

The lighter hydrocarbons separated in the flash tower and the heavier ones obtained from the vertical still will pass through condensers to form natural gasoline. Excess vapors not condensed in the operation will be passed through a reabsorption tower. From the condensers, the natural gasoline will pass through a stabilizer, thence to cylindrical horizontal storage tanks. The plant will be equipped to separate lighter hydrocarbons such as propanes and butanes.

One Netherland Well Yields 260 Bbl. Daily

One of the three wells completed in Drenthe Province, Netherlands, is reported to be producing 260 bbl. daily. The field was discovered during the war with the first producer completed at about 2,500 ft. The field is in eastern Netherlands, near the German border.

Sinclair Seeks Exploration Privileges in Panama

PANAMA CITY.—Sinclair Oil Co. has submitted to the Government of Panama a request for the right to explore for oil in this country. President Enrique Jimenez revealed that in addition to a $100,000 guarantee, Panama would receive 16⅔ per cent of the gross return on all oil produced. A decision will be announced after the cabinet completes its examination of the plan, Jimenez said.

New Catalytic Plant Possible for Colombia

Possibilities of installing a new catalytic cracking plant in Colombia are being studied by Tropical Oil Co., it is understood. Low-gravity crudes could be converted from 60 to 80 per cent into motor fuel through catalytic cracking. This would offset the low gasoline content and at the same time provide a higher octane product.

Period of Exploitation for Tropical Ends in 1951

BOGOTA. — A decision handed down by the Supreme Court declared that the 30-year exploitation period granted Tropical Oil Co. to develop the De Mares Concession expires August 25, 1951. The court declared also that all machinery, equipment, refining facilities, etc., would revert to the Government. In the light of this decision an executive resolution has been issued prohibiting Tropical from removing any equipment from the concession. The oil inspector is charged with enforcement of this ruling. The military may issue special permits, however, if occasion arises. This means that Tropical's exploratory program cannot count on warehouse and other facilities which the concession offers except by special permission of the ministry.

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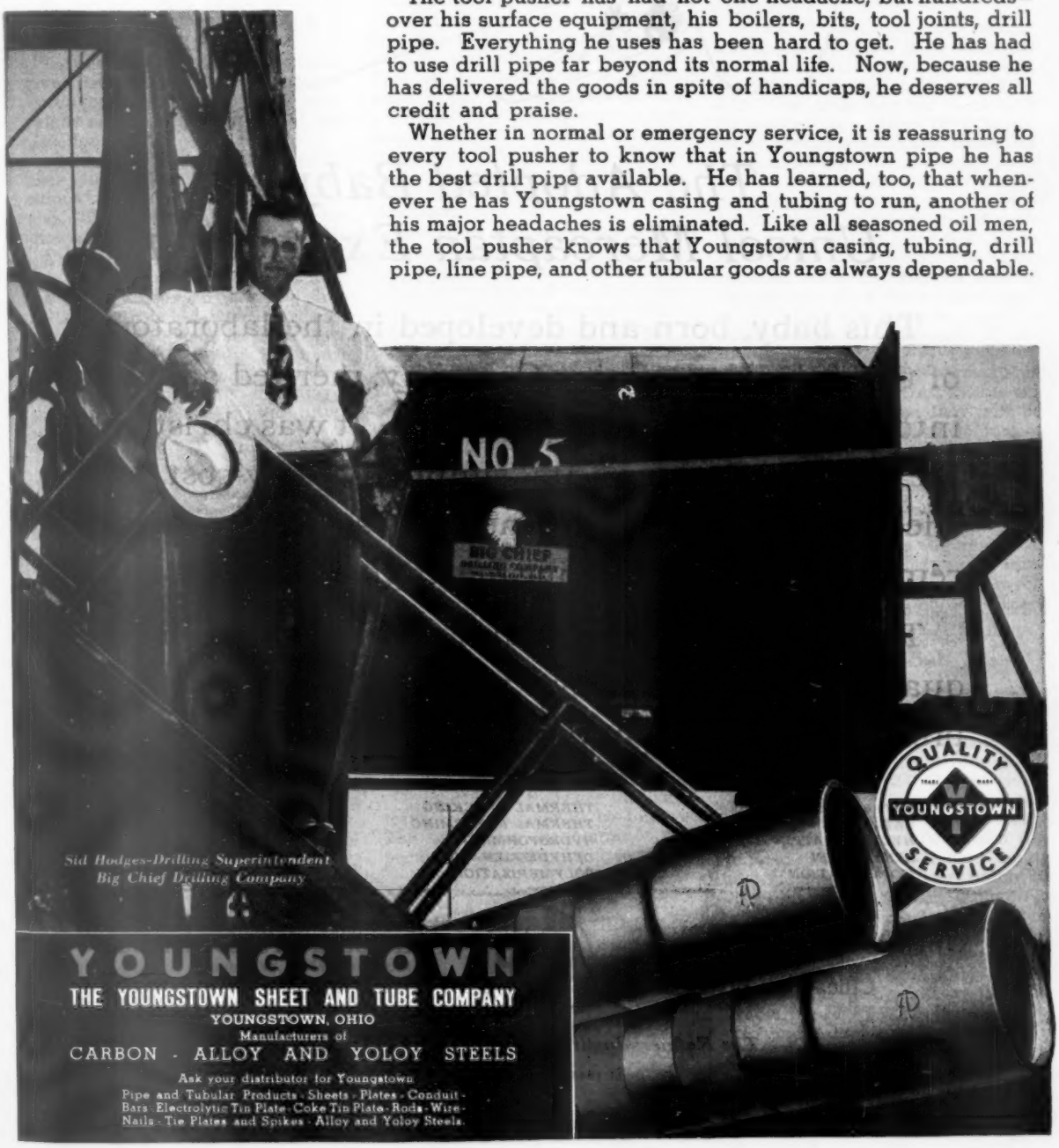

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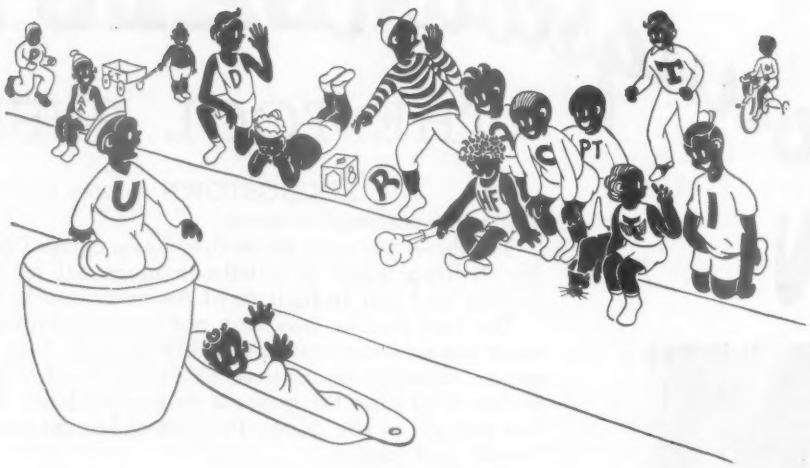

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Exploration to Continue Far Above Prewar Levels

by Charles J. Deegan

END of the war has brought a period of uncertainty to the petroleum industry, and cutbacks in the current high rates of domestic production are taken for granted. However, for the longer range, after the period of adjustment, there is a spirit of optimism.

To determine what the probable immediate effect of this mixture would be on the exploratory campaigns of the industry, The Oil and Gas Journal has just completed a sample poll of key executive geologists who occupy policy-making positions in their respective companies. The results of this poll are shown in Tables 1 and 2.

The composite judgment of these men is that wildcat drilling and leasing activity between now and July 1, 1946, will fall less than 15 per cent below 1944. This indicates a level of exploratory activity far above that considered normal in prewar periods, and indirectly indicates a spirit of confidence in the future that is extremely optimistic.

The poll covered only the short-term prospects, up to July 1, 1946, but the trend of opinion on leasing activity, indicating a slight upturn in the second quarter of 1946 compared to the first quarter, might well be interpreted in combination with the trend of wildcat drilling, as showing that the middle of 1946 would be the lowest point reached, with an upturn thereafter quite possible.

It is reasonable to interpret these figures as meaning that within 3 to 5 years, these key executives anticipate a need for all the oil that can be found and produced at efficient rates. If they anticipated a prolonged period of overproduction ahead, they would certainly be predicting much more drastic reductions in the current record high levels of wildcat drilling and lease acquisition.

On the other hand, if they anticipated a need within 3 to 5 years for all the oil now in sight, plus additional quantities to establish an efficient sustaining reserve for that production, they would proceed exactly as they now think they will. That is, realizing that in normal times, a long period elapses between the initiation of an exploratory campaign, and the development of a substantial daily rate of production, they would continue a comparatively heavy leasing and wildcat drilling campaign.

During the war, responsible geologists often said that the quality of their exploration campaigns had deteriorated because of too much pressure on limited manpower. There were far too many active prospects and too few men to permit proper interpretation of the geological and geophysical data that had already been gathered. Furthermore, there were not enough men to gather the additional data that in many cases was obviously required for an accurate evaluation of particular prospects.

Considering this background, one of the first objectives of key executive geologists appears to be a desire to improve the quality of their wildcatting campaigns. This improvement can be achieved either by curtailing the volume of prospects handled while keeping the manpower stationary or by keeping the volume of prospects handled constant and increasing the manpower assigned to the task of interpretation, or by some combination of these two.

Present indications are that an intermediate course will be followed. The small drop in volume of prospects will probably be accompanied by some increase in manpower, as geologists and geophysicists return to their companies from the armed forces. Partially offsetting this, however, will be a return to a shorter work week.

One very important factor in the quality of future exploration campaigns falls into the intangible class. That factor is the effect that can be expected from a more efficient utilization of the older and more experienced geologists. Too often during the past 2 years, manpower shortages have compelled executives to divert experienced men to time consuming routine work that normally would fall to the younger geologists.

Normally the most experienced and able men would have been utilized in examining and interpreting geological information in the office, with field trips devoted to picking up missing key pieces of evidence for or against a particular project of substantial importance. Geology is still an inexact science and in exploration work there is no substitute for the ability to interpret and evaluate prospects that come from years of practical experience. Therefore, relieving these experienced men of routine jobs when the younger geologists return will probably result in improvement in the quality of exploration work.

All the evidence now available points to a feeling by responsible executive geologists that they will be called on to find a large volume of new reserves just as quickly as possible. Apparently they are making their plans on that basis, realizing that the present temporary lull in demand merely affords them an opportunity to increase the quality of their exploration effort with a minimum reduction in the actual volume of prospects leased and tested.

TABLE 1—PROBABLE TREND OF WILDCAT DRILLING

	Change (%)
1945—Fourth quarter vs. 1944 same period	—10.5
1946—First quarter vs. 1944 same period	—13.0
1946—Second quarter vs. 1944 same period	—14.5

TABLE 2—PROBABLE TREND OF LEASING ACTIVITY

	Change (%)
1945—Fourth quarter vs. 1944 same period	—11.7
1946—First quarter vs. 1944 same period	—12.9
1946—Second quarter vs. 1944 same period	—12.0

PIWC Meeting Set For October 24

WASHINGTON.—The next meeting of the Petroleum Industry War Council has been tentatively scheduled for October 24. Originally set for September 26, the meeting was postponed because of the absence from Washington of Petroleum Administrator Harold L. Ickes, Deputy Petroleum Administrator Ralph K. Davies, and Chairman William R. Boyd, Jr., and several other council members who are attending the Anglo-American oil conference in London starting September 17. The October meeting might be the final gathering of PIWC because the Petroleum Administration for War is liquidating rapidly and after the end of October there may be no problems of industry-government war-time regulation to warrant another meeting of the group.

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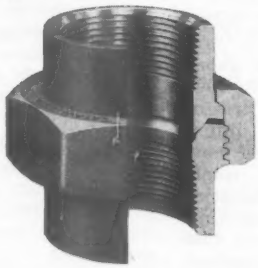

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FPC To Open Natural-Gas Investigation in Kansas City

by Henry D. Ralph

WASHINGTON.—A thorough investigation of virtually every aspect of the natural-gas industry and its possible future opens before the Federal Power Commission in the City Hall in Kansas City, Mo., September 18.

Long contemplated by FPC, the investigation has been opposed by most elements in the natural-gas industry and viewed with some skepticism by state regulatory bodies because of a fear that the commission is seeking to extend its jurisdiction so as to control detailed activities of the gas business.

The commission, however, insists that it is not trying to prove any case but simply seeks facts on which it can base policies for use in deciding the pipe-line construction and wholesale-rate cases which come before it under its existing powers. However, a report eventually will be made to Congress which might serve as the basis for new legislation further extending the authority of the federal Government over the gas industry.

Many months of hearings and study will precede the final report, which is not expected before late spring at the earliest. Other hearings have been set in Oklahoma City, October 9; New Orleans, October 30; and Dallas, November 27. Each of these may take about 2 weeks. After the first of the year other hearings will be held in consuming areas and one in Washington to obtain the views and reports of other federal agencies which may be interested in the subject.

All the material for the investigation will be obtained from voluntary witnesses, at least during the early stages. The FPC staff has not prepared any reports or exhibits. Its task will be to digest, correlate, and analyze the testimony, though later it may find some original research work necessary to fill in gaps or explain discrepancies.

The hearings will be conducted by the FPC chief counsel and other staff employes, but at least one member of the commission will be present at each hearing. Witnesses have been asked to confer with the staff in advance regarding time and length of appearance and nature of testimony to be offered. An outline of procedure, published last July, listed the topics on which information is desired, and an effort will be made to avoid duplication in order to keep the record from being unduly large. Attorneys for various interests have complained against the rule prohibiting cross examination of witnesses, but the commission explains that the investigation is not a lawsuit and will be conducted more along the lines of a legislative committee hearing. Witnesses may file additional or rebuttal statements if in disagreement with any of the testimony. Such a large number of parties have indicated an intention to participate in the investigation that FPC has asked witnesses to prepare at least 200 copies of all exhibits where possible.

Following the final hearings next spring it is planned that the FPC staff will issue a tentative or proposed report and that interested parties will then have an opportunity to file briefs or additional material before the commission's formal report goes to Congress.

The investigation will cover every phase of the natural-gas industry, from statistics on production to the possibilities of synthetic production of substitute fuels. Among the most controversial issues will be the proper fields of state and federal jurisdiction in regulating natural-gas production, transmission, uses, and rates; control of gas wastage, particularly when produced in connection with oil production; conservation practices designed to prolong the life of gas fields; the desire of some producing states to limit the export of natural gas from their borders; opposition of competing fuel interests to further expansion of gas-transmission lines, particularly into the Appalachian region; and suggestions that the "end uses" of natural gas be regulated on the ground that it is too valuable a natural resource to be used for fuel or other "inferior" purposes.

There are pending in Congress several proposals for investigations of transportation facilities and of natural resources, most of which might involve the natural-gas industry, but it is probable that none of these will go into natural gas very extensively until the FPC report has been completed. Because of the many issues involved and the tremendous interests at stake, the FPC investigation is expected to be exceedingly voluminous and complete, and the final report may become the basis for state and federal regulation and for company policies for many years in the future.

Directive 59 Slated For Early Demise

NEW YORK.— Directive 59—that 3-year-old industry headache of the East Coast—will pass out of existence, actually if not formally, September 30.

Petroleum Administration for War's District 1 headquarters here still is making no definite announcement of "59's" demise beyond the noncommittal promise "It is not likely that Directive 59 will be required for a longer period of 60 days." However, it is reliably reported that September is the last month for scheduling shipments under the directive, and hence the regulative instrument will have no real meaning beyond October 1. Until perhaps well on to the first of the year certain routine problems will remain, such as adjustment of over and under-assignments, balancing of inventories and various paper work. For these chores about 50 per cent of PAW's district staff will continue on the job until the agency's end.

So far the only official word is that of PAW's District 1 director, Charles L. Harding, who has notified all original suppliers that "Directive 59 will be rescinded just as soon as sufficient tankers are available to substantially restore normal movement to maintain minimum working inventories."

All product pipe lines in District 1 which have been reversed during the emergency will return to normal operation, PAW discloses. The Florida Emergency Pipe line and the Richmond extension of the Plantation line are to be discontinued "in the near future," says Harding, but he adds that the timing of such action has not yet been decided.

As a parting shot before Directive 59 becomes history, Harding has appealed by letter to all original suppliers "to conform with the provisions of the directive during the remaining period of its operation. Redistribution will continue. You are again urged to lift assignments promptly and refrain from withdrawals from unassigned inventory. Should product available to you in local areas under provisions of the directive be insufficient to meet your demand, the Zone Office of the D & M Committee should be contacted and arrangements made for advance assignments or emergency reassignments."

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HOUDRY CATALYTIC PROCESSES ... FOR VICTORY IN WAR AND FOR PROGRESS IN PEACE

Negotiations on New Anglo-U.S. Treaty Will Open September 17

WASHINGTON. — Negotiations of a new Anglo-American petroleum treaty will open in London September 17, with the U. S. delegation consisting of Harold L. Ickes, secretary of the interior; Ralph K. Davies, deputy petroleum administrator, and Charles B. Rayner, petroleum adviser to the State Department.

Six oil-industry leaders accompanied the delegation as advisers, all of them members of the national oil-policy committee of the Petroleum Industry War Council. They are William R. Boyd, Jr., chairman of PIWC and president of American Petroleum Institute; A. Jacobsen, president of Amerada Petroleum Corp. and chairman of the oil-policy committee; George A. Hill, Jr., president of Houston Oil Co.; W. Alton Jones, president of Cities Service Co.; Joseph E. Pogue, vice president of Chase National Bank, and Ralph T. Zook, president of Independent Petroleum Association of America.

The primary purpose of the conference is to obtain British acceptance of an American redraft of the original treaty which was signed in Washington August 8, 1944, but not ratified by either government. Violent criticism from the American oil industry and evident congressional coolness caused the President to withdraw the pact from the Senate where it had been sent for ratification. Subsequently a new draft was worked out at a series of government - industry conferences, and this will be the basis for the new negotiations.

While the text of the revision has never been made public it is understood to embody the professed objectives of the original while removing virtually all the objections which had been raised by the industry. The principal changes relate to the powers of the contemplated International Petroleum Commission. The redraft makes it clear that the commission will be advisory only, and that it cannot issue orders to private corporations or oil operators nor will signatory governments be bound to follow its recommendations. There is also a reservation that in the United States the treaty does not give the federal Government any powers heretofore reserved to the individual states.

The general objectives of the proposed pact are to provide the nationals of all countries equal opportunity to develop and market petroleum throughout the world and to insure fair treatment both to producing countries granting concessions and to companies operating abroad. The International Petroleum Commission is expected to function much like the Interstate Oil Compact Commission in this country, and to hold conferences, make technical and statistical studies, and issue reports and recommendations.

For administrative purposes the commission probably will have a loose connection with the Economic and Social Council of the United Nations Organization, as will other international bodies set up for special purposes.

Originally it was intended for the Anglo-American pact to be an interim agreement, to be followed by a general international conference to draft a multilateral oil treaty. Present plans are to have the new agreement so worded that other nations may subscribe to it simply by signing and ratifying, and it is expected that most other important oil-producing and oil-consuming nations will do so.

Other international oil problems may also be discussed at the London conference. Among these probably will be the desire of American oil companies for exploration concessions in Iran, where British capital is now dominant, and liberalization of agreements which have hampered development of American oil interests in other parts of the Middle East. Another problem likely to be discussed is the rehabilitation of oil properties in Europe and distribution of petroleum products in liberated and occupied areas of Europe.

Derequisitioning of Tanker Fleet East Coast's Biggest Problem

NEW YORK.—Derequisitioning of the nation's great war tanker fleet is now the single biggest problem for the oil industry of the East Coast. The suddenness with which the war ended threw the whole derequisitioning program into a state of confusion from which Petroleum Administration for War and War Shipping Administration are trying to emerge.

For industry the questions are:

1. What will be the formula for the derequisitioning of the tankers taken over from the companies by WSA in April 1942?

2. What revised rate structure is in prospect and what will be its meaning for industry operations?

It has been learned that WSA and PAW officials met here recently and mapped a tentative derequisitioning policy. Among the conferees were J. J. Winterbottom of WSA and George Wilson, head of PAW's supply and transportation division at Washington. Out of this conference the following principles developed:

1. Derequisitioning must proceed as rapidly as possible.

2. WSA may perhaps find it advisable to retain control over even those tankers returned to the industry until, say, 95 per cent of the carriers are back in company hands. This was suggested as a competitive safeguard for those boat owners who would get their ships back more slowly than others.

3. There should be some reduction in the current basic 40-cent rate, round trip, Port Arthur to New York.

It was at first proposed that a derequisitioning date be set on which the tankers would be returned. The joint PAW-WSA parley, however, saw no merit to that proposal because derequisitioning must in effect be piecemeal — the tankers are scattered all over the world and will have to be turned back to their owners as the ships come into port.

The second proposal providing for a continued WSA control met with objection, and 2 days after the PAW-WSA conference, Reconstruction Finance Corp. dropped the tariff on the 20-in. pipe line to make the products line competitive with tankers. This action, too, followed industry suggestion that a noncompetitive position be created as to the pipe line and water movement so that those companies which experienced delay in receiving their boats could temporarily use the products line without disadvantage.

The rate problem is strictly a WSA matter and PAW and other agencies, as well as industry representatives, have carefully avoided any open discussion of rates because of the always-present danger of antitrust action. However, it is known that WSA favors the rate cut, and 30 cents is generally believed to be the figure at which WSA will fix the Gulf to North-of-Hatteras tariff.

XUM

Indiana Standard to Build Great Research Plant

CHICAGO.—Construction of great research laboratories, permitting expansion in this field, has been started by Standard Oil Co. (Indiana) on land recently acquired in Hammond, Ind., near the company's Whiting refinery, with which it will be connected by pipe line. Without waiting for settled peace conditions, the company has begun work on the main administration building, general laboratories, and three pilot-plant buildings. A cafeteria, engine laboratory, greenhouse for insecticide work, additional pilot-plant buildings, and other research facilities are scheduled for later construction.

The basic unit will be a two-man laboratory. Partitions will be removable so as to permit easy alteration to one-man laboratories or larger areas as may be desired. The width of a one-man unit is to be 11 ft. Since the main corridor will be off center, the laboratory lengths will be either 18 or 22 ft.

Space will be available for returning veterans without displacing any of the present research staff. The company plans to take back 179 laboratory employes still with the armed forces without dismissing any of its temporary replacements. The technical service group will continue in the refinery, close to the operations it serves.

Construction of the new plant is expected to provide at least temporary employment for men released by cutbacks in war industries. It is expected also that the new products developed by research will help create new jobs and increase permanent employment. In addition to the work on improved fuels and lubricants, part of the research in the new laboratories will be in connection with Standard of Indiana's recently established chemical products department.

Hotel Congestion Forces Cancellation of Meeting

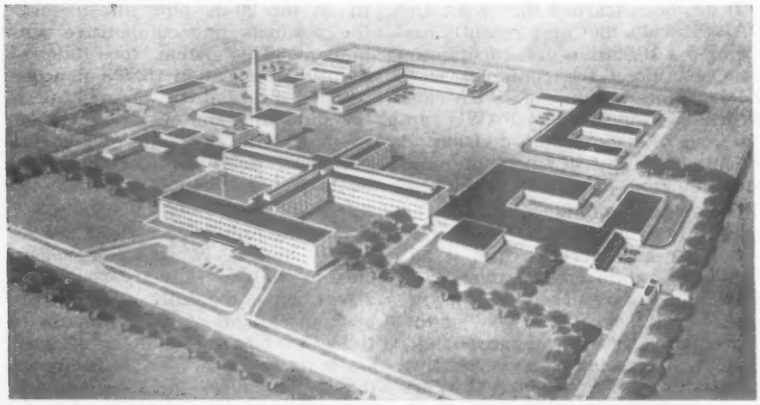
DALLAS.—Continued hotel congestion has forced the Texas Mid-Continent Oil and Gas Association to cancel plans for its annual membership meeting, which was scheduled for October 4-6 in Houston. Instead, George C. Gibbons, executive vice president, said, a directors' meeting will be held at a date to be announced later.

Expanded Activity Planned By New Scout Officers

AUSTIN.—The newly elected officers of National Oil Scouts and Landmen's Association will meet at the organization's headquarters here early in October to discuss the forthcoming year's work and lay plans for expanded activity. The war has left difficult problems for solution. The new officers are: H. F. King, Continental Oil Co., Ardmore, Okla., president; F. D. Johnson, Superior Oil Co., Corpus Christi, Tex., first vice president; Hal Walker, The Ohio Oil Co., Casper, Wyo., second vice president; R. M. Knoepfel, The Atlantic Refining Co., Carlsbad, N. M., secretary-treasurer; W. G. Sinclair, Gulf Oil Corp., Wichita Falls, Tex., editor-in-chief.

Falck to Open Business Consulting Service

WASHINGTON. — Edward Falck, who is retiring as director of the War Production Board's Office of War Utilities with the dissolution of that office September 30, is establishing a business consulting service and plans to open offices in New York and Washington early in October. He will engage in industrial, management, and public-relations consulting work for individual firms, particularly in the public-utility and natural-gas industries.



Architect's sketch of new laboratories of Standard Oil Co. (Ind.), which will cover two city blocks in Hammond, Ind., adjacent to the company's Whiting refinery

DEATHS

Richard Vryling LeSueur, 64, president and chairman of Imperial Oil, Ltd., and of International Petroleum Co., its subsidiary, died September 6 in Toronto. The two companies are affiliates of Standard Oil Co. (New Jersey). LeSueur began his business career in Sarnia, Ontario, as a lawyer, following graduation from Toronto University and Osgoode Hall Law School, and he served a term in the Canadian House of Commons as a representative of West Lambton. Following a career that carried him into oil fields of western Canada and Latin America, he was elected in 1926 to the board of International Petroleum. He became vice president of Imperial in 1933. In 1944 he was elected president of both companies and later chairman of both boards. LeSueur was active in development of Turner Valley and Norman Wells in northwest Canada, and as an official of International Petroleum he did similar work in Venezuela, Colombia, Ecuador, and Peru. He was vice chairman of the war finance committee of Ontario, an organization corresponding to those which conducted the American war bond drives.

Capt. Harold A. Cunningham, 61, manager of the Port of New York office of Standard Oil Co. of New Jersey, and formerly commodore of the United States Lines fleet and navigating officer of the famed Leviathan, died September 1 in New York.

George E. Kadane, president of Kadane-Griffith Oil Co., died September 7 in Wichita Falls, Tex. Kadane, a native of Syria, drilled the 1 Mangold, which opened the west extension area of the great KMA field in West Wichita County, Texas.

William E. Gray, 47, one of the passengers killed in the airliner crash off the South Carolina coast September 7, was vice president and general manager of Dominican Seaboard Oil Co., affiliate of Standard Oil of New Jersey. Gray for many years was a district superintendent in charge of drilling for other affiliates of Jersey Standard in Venezuela.

Floyd Feely, 65, retired drilling contractor of Cherrytree Township, Venango County, Pennsylvania, died September 5 at Battle Creek, Mich.

Truett M. Russell, 41, bulk-plant manager for Standard Oil Co. of Louisiana at Gulfport, Miss., died in that city September 5 of burns suffered in a gasoline-pump fire.

HYCAR'S versatility means money saved in acidizing service

Photo courtesy L-K Pump Valve Co.

IT used to be common practice to replace the valve inserts in acidizing pumps after each job. That's because the materials used couldn't stand the action of the mud and salt water, oil and gas, slush and sand, hydrochloric acid and acid wash, all of which pass through the same pump in the acidizing unit.

That practice has been changed now, however, by smart oil men who have discovered that inserts made from Hycar synthetic rubber are resistant to *all* these usually destructive agents. As many as *8 acidizing jobs* have been performed with a single set of Hycar inserts without any signs of leakage whatever.

Hycar's other important inherent properties are shown in the box at the right. They explain the versatility of this unusual resilient material that *stays* resilient even in the toughest jobs. They tell why Hycar has become practically the standard resilient material in the oil industry—why it's ideal for gaskets and hose of all kinds, piston packers, blow-out preventers, slush pump valve inserts, mud line gate valve packers, and scores of other applications.

Ask your supplier for parts made from Hycar. Test them in your own applications—difficult or routine. You'll find for yourself that parts made from Hycar will save you money, give you more efficient service—that it's wise to use Hycar for long-time, dependable performance. *Hycar Chemical Company, Akron, 8, Ohio.*

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7. *Has minimum tendency to cold flow and compression set.*

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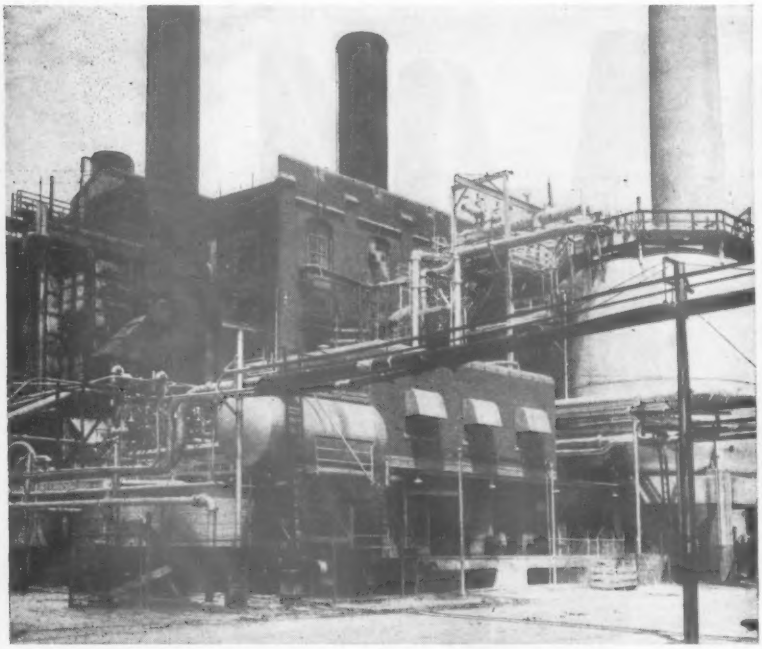


Central power plant and the two largest of the refinery's water-treating units

Long-Range Plans Improve Refining Efficiency

by R. B. Tuttle

LONG-RANGE planning as worked out by Humble Oil & Refining Co.'s utilities division is typical of the petroleum industry's solution of problems involving material and manpower shortages. With its operating personnel slightly less than that employed in prewar operation, the power and water branch of the division at the company's Baytown refinery shows an over-all efficiency improvement over the previous year's operation. The current year's efficiency improvement, which runs to several per cent, is due largely to the cooperative efforts of the division's operating staff in supporting planned procedures for preventive maintenance and for equipment operation. Although the power and water facilities at the refinery, during prewar periods, were operated at efficiencies which are considered to be well into the top bracket, the few per cent increase accomplished under war conditions is commendable.

To supply the demands of the refinery proper, which have been stepped up considerably during the past several years, and to supply both industrial and domestic water to two recently completed war plants which are adjacent to the refinery, the power and water facilities at Baytown have been increased by the addition of one river water pumphouse, one 600-psi. boiler house, one water treating plant, and two power houses since the war was started.

Another important contributing factor in the efficiency figure on equipment operation is that of quick but thorough methods for cleaning boilers, feed-water heaters and other like equipment which require periodic cleaning. Along with reducing shutdown time of equipment used in the system for supplying water for all emergencies and minimizing the use of natural gas for boiler fuel, many lesser, but equally important, operations enter into the division's over-all planning for war emergency operation.

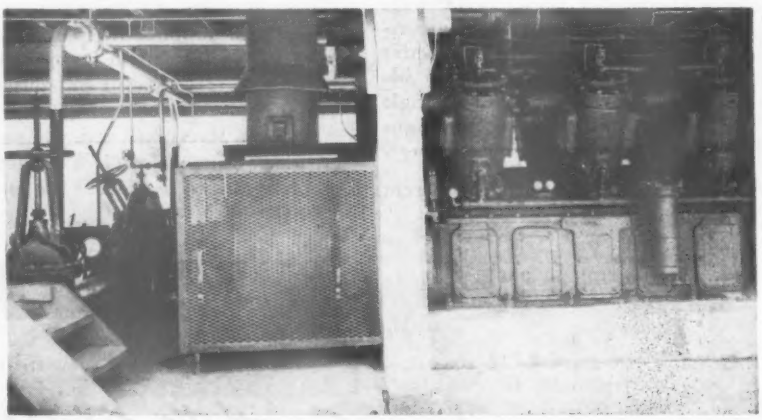
Steam generating facilities are set up in six boiler houses, two of which produce 600 psi., 750° F. total temperature superheated steam for electric-power generation. The remaining four boiler houses generate 150 psi. steam which is sufficiently superheated economically against condensation in transmission.

In the accompanying Table 1 are shown the kinds and percentage of each kind of fuel consumed at each of the six boiler plants. This fuel consists of the refinery waste that is cracking coil coke, heavy acid sludge, normal acid sludge, and refinery gas which is disposed of by burning in the boiler plants for the generation of steam. One 150 psi. boiler of the entire group is equipped

TABLE 1—FUEL CONSUMED BY BOILER HOUSE UNITS
(Values in per cent)

Fuel*—	1 and 2	3	4	5	6	Per cent total all units
Refinery blend gas	89.6	92.7	....	80.0	99.8	85.5
Natural gas	...	...	100.0	...	...	1.5
Fuel oil	9.2	0.1	....	0.3	0.2	1.0
Sludge	1.2	5.6	...	19.7	..	11.8
Coke	...	1.6	....			0.2

*Converted to equivalent (6,000,000 B.t.u.) barrels.



Gas-engine drive for pump at river-water pumping station

to burn coke. This boiler is provided with a traveling chain grate, hopper and conveying system. Another 150-psi. boiler is used for burning heavy acid sludge and is equipped with rotary kiln type burners. Normal acid sludge is burned in five 150-psi. boilers and two 600-psi. boilers. These are equipped with the conventional type of atomizing burner. The remainder of the boilers burn fuel oil or gas.

Refinery blend gas used for boiler firing comes from various sources within the refinery and because of the variation in boiler fuel demand and in fuel production volumes, natural gas is used for make up. As a result, a wide variation is experienced in the heat content of the blend gas but difficulty in firing under these conditions has been reduced to a routine matter by the power plant's operating personnel.

Electric-Power Generation

Electric power generation is carried out with turbine and gas-engine-driven units. No. 1 power plant consists of four condensing turbine units which operate on 150-psi. steam. Nos. 2 and 3 plants are equipped with turbine drives, and use superheated steam from the plant's 600-psi. system to produce power. These latter units, operating against a back pressure of 150 psi., generate over 70 per cent of the electric power manufactured at the refinery, and the exhaust steam is used for process operation. Two-cycle, 900-hp. gas engines drive the four generators at No. 4 power house. Except in extreme emergencies the refinery's electric power generating facilities supply the electricity for operating 64,000 connected horsepower in the plant. The connected-horsepower figure includes all electrical motors within the plant and therefore does not represent the horsepower load for the plant's normal operation as ratings of standby and emergency motors are included.

Water is supplied to the refinery from three main sources. Salt water, which is obtained from the bay adjacent to the refinery, is used for fire fighting and cooling purposes. Industrial water for cooling, condensing and for boiler feed comes from a mixture of river water and well water. The domestic water supply for the refinery is obtained from deep wells.

Salt water is not treated in any manner and, hence, is pumped directly from the bay into separate systems, one being used solely for fire fighting and the other for cooling process equipment. The fire-fighting system parallels the foam system pipe lines throughout the refinery and tank farm. Ample hose connections are provided in all areas of the plant.

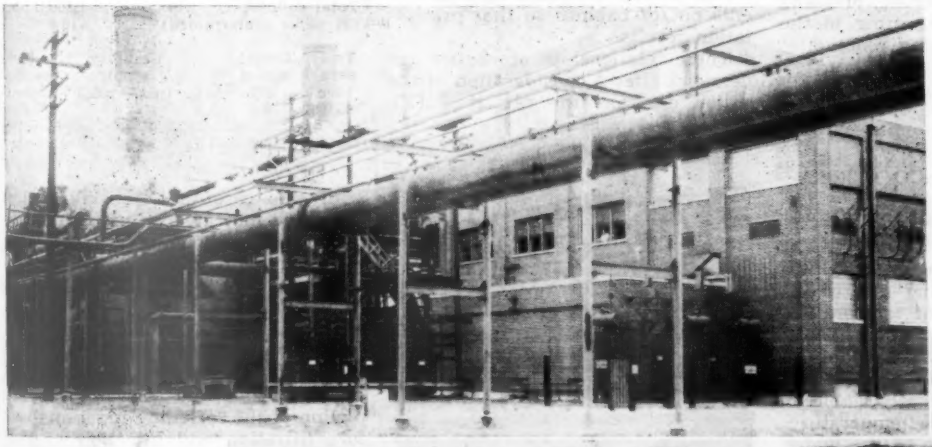
Industrial surface water is brought from the San Jacinto River which is 18 miles from the plant at the point of takeoff. The water is brought by canal from the river to storage in two reservoirs which have a combined capacity equivalent to 90 days' operating supply. Located about 8 miles from the refinery, the larger of the two reservoirs covers an area of 1,100 acres, which area is about 10 times greater than that of the small reservoir. The small reservoir, which is located at the refinery, has a maximum capacity of 107,000,000 gal. and serves as a direct supply source for the plant, whereas the larger serves as an indirect source of supply. Levels in the small reservoir are maintained by makeup from the large.

Pumping facilities for the plant's surface water requirements are installed at the small reservoir. Four 275-hp., V-type, 6-cylinder gas engines power the pumps which deliver the water to the plant at 60-psi. normal pressure. Rated capacity of the river water pumping facilities is given as 18,000 g.p.m.

Deep wells supply a large part of the industrial water and all the domestic water used by the refinery comes from this source. Nine wells, having a test capacity of over 16,000,000 g.p.d., are in service at the refinery. In the group of nine wells, one has been in service for more than 20 years and six, for more than 16 years. Extraction rates increased over 10 per cent at the beginning of the war emergency period to meet water requirements. During the 1943 period an over-all service factor of 84.6 per cent was reached for well operation and with the placing of the surface water system into service in late 1943 the service factor dropped to 79 per cent.

Industrial water consumption at the refinery, which includes both well and river water, averages 103 gal. per barrel of crude charge and

(Continued on page 106)



Left—The high-pressure turbogenerator units which exhaust at 150 psi. are housed in this building. In background are two 600-psi. steam-generating units

Right — River-water pump station, located adjacent to refinery

Periodic Tests Insure Injection-Water Quality

*by Joe R. Wright**

It is widely known that a perfectly clear water may not be entirely suitable for injection purposes. However, the exact nature of reactions which occur due to injection and mingling of waters is not well understood. Application of stability-index calculations shows the characteristics of a stable water at formation temperature and provides a definite control for quality of injected water. Previous articles on qualities of water have appeared in the issues of June 23 and July 14, 1945.

NO definite nor infallible rules have been formulated for the treatment of water for flooding and injective purposes under all conditions. The face of a sand formation acts as an efficient filter. Obviously then, it would be the safest procedure to maintain a flooding water free of all suspended matter. Practice has shown that a turbidity of 1 p.p.m. or less will not cause plugging in a sand of average permeability. It is also recognized that flooding water should not contain compounds which are incompatible with those in the brine of the oil formation. Many such compounds are easily recognized, while others are not. One example of compounds which would cause precipitation in the sand is the presence of sulphate in the flooding water when the formation brine contains appreciable amounts of barium or strontium.

Sometimes flooding water is clarified by coagulation with lime and alum before filtration. In such event it is possible to use an overdose of lime, or to allow insufficient reaction time, so that the water may enter the formation carrying some unreacted lime in solution. Since formation brines usually carry appreciable calcium bicarbonate, plugging action may result according to the familiar water-softening reaction:

$$Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3 + H_2O$$

A similar reaction will occur if the flooding water contains carbonate:

$$Na_2CO_3 + CaCl_2 \rightarrow CaCO_3 + 2NaCl$$

Plugging at Well Face and Within Formation

A flooding water may cause precipitation and plugging due to instability as a result of temperature increase in the formation. Thus, a given flooding water may be quite clear, containing no incompatible compounds and apparently stable at prevailing atmospheric temperature. Nevertheless, injection of the water into an oil formation at 110° F. could accentuate a slight scale-forming tendency so that plugging may result. Such plugging, resulting from slow precipitation, is believed to penetrate formations for relatively large distances, while that resulting from inert suspended matter accumulates at or near formation face.

*Wright Petroleum Laboratories, Tulsa.

Plugging of input wells by unstable water may become a common occurrence, as water-flooding practice continues to gain favor, unless proper consideration is given to flood-water characteristics. In some areas where water is difficult to obtain in large quantities, it is common practice to mix creek or pond water with waste brine for injection. Such water is suitable if stabilized and simple filtration is ordinarily not enough to accomplish this. Mingling a fresh water of relatively high bicarbonate content with a salt water throws the resulting constituents out of balance so that precipitation results.

These relationships are better understood after a consideration of the scalar diagram for pH at $CaCO_3$ saturation. (See the Oil and Gas Journal, June 23, 1945, page 100.) It will be noted that an increase in temperature, pH, calcium, or alkalinity will cause an increase in plus values for stability index. Plus values represent a scale-forming tendency. This may be determined by experiment, giving a single factor an increase in value while allowing all other factors to remain constant. Likewise, decreases in these values will bring about corresponding decreases in stability-index values. Increase in total solids decreases stability-index values if other values remain constant. The correction for total solids is quite small, relative to other factors present, and the scale may be extrapolated to allow estimation of stability index in dilute brines.

Fig. 1—An input well on a Nowata waterflooding project was practically plugged over the sand face by this kind of "chalk" (chiefly calcium carbonate) deposit from the unstable (positive stability index) water

Examples of Injecting Unstable Water

Some examples are shown which illustrate in a practical manner the results of injecting unstable water and the use of stability-index calculations for corrective and preventive measures.

The effects of flooding a single injection well near Nowata, Okla., have been closely observed. The operator reported that the pressure necessary for injection continued to increase until a small "shot" of acid was used. This reduced the input pressure only temporarily and rather rapid pressure increase was again noted until it became necessary to repeat the acid treatment in a short time. Analysis of the flood water gave the following results:

Ca (as $CaCO_3$)	210 p.p.m.
Total alkalinity (as $CaCO_3$)	79 p.p.m.
Total solids	1,100 p.p.m.
pH value (determined)	10.2

Temperature	Determined pH	pH_s	Stability Index (pH — pH_s)	Interpretation
65°F.	10.2	7.8	+2.4	Scale forming
100°F.	10.2	7.5	+2.7	Scale forming

In this case the unusually high pH value indicated an unstable condition due to chemical treatment. A breakdown of the alkalinity determination showed a small amount of normal carbonate and lime-soda ash softening was therefore indicated. It was found that partial lime-soda ash softening was used and insufficient time was allowed for completion of the softening reactions before filtration and injection of the water. The result was that the water was being injected into the formation at a turbidity of about 10 p.p.m. Cause of the plugging was due in part to accumulation on the sand face.

The formation brine contained abundant "permanent hardness," in this case the chlorides of calcium and magnesium, which caused a pre-

cipitate when combined with the unreacted soda ash. The degree of scale-forming tendency in this water is shown to be sufficient to cause trouble without the turbidity and secondary reactions which occurred within the formation. Fig. 1 illustrates a piece of the "chalk" which was removed from the bottom of the injection well.

Corrective treatment consisted merely of allowing more time for completion of the softening reactions before filtration and injection of the water. The stabilization of this water could have been speeded up by aeration or recarbonation if it had been necessary to process a larger volume with the same equipment.

The addition of acid or acid salt to lower pH after filtration would also have produced a stable water. In other words, complete analyses are not necessary in the control of stability of this flooding water. It will be noted that the pH_s, or pH at equilibrium, of the flood water is 7.5 at 100° F. which is approximate formation temperature. It follows that, provided the water characteristics remain reasonably constant, it is merely necessary to keep the pH of this water at or near pH of 7.5 to prevent precipitation and plugging of the injection well.

Mixtures of Fresh and Salt Water

Water flooding operations in southeastern Kansas have been successful in several areas where it has been necessary to use water from two or more sources. Where it has been found convenient to use a creek or pond water, combined with waste brine, removal of turbidity by coagulation and filtration usually results in a water so near actual stability that no plugging action takes place in the injection wells. This fortunate relationship is illustrated in the following analyses:

WATER FOR FLOODING, ALLEN COUNTY, KANSAS

	Waste (Arbuckle) Brine	Creek Water
Ca, as $CaCO_3$, p.p.m.	200	175
Total alkalinity, as $CaCO_3$, p.p.m.	350	200
Total solids, p.p.m.	1,500	400
pH (determined)	7.0	7.0
pH_s at 100° F.	6.86	7.15
Stability Index at 100° F., ($pH - pH_s$)	+0.14	—0.15

It will be noted that both of these waters are so near stability that chemical adjustment is not necessary. Also, mingling these two waters in any proportions does not bring about a scale-forming tendency. Such ideal relationships do not always exist.

Specific cases are known where mingling a fresh water with brine produced a water of decided scaling tendency. Near Nowata, a brine was mixed with a well water and rapid accumulation of tubing scale in the injection well was noted within a few months. Analyses of the well water and mixture are stated:

	Water well, Nowata	Waste brine and water from well, Nowata
Ca, as $CaCO_3$, p.p.m.	150	1,600
Total alkalinity, as $CaCO_3$, p.p.m.	192	190
Total solids, p.p.m.	195	15,000
pH (determined)	7.5	7.3
pH_s at 100° F.	7.1	6.3
Stability Index, 100° F.	+0.4	+1.0

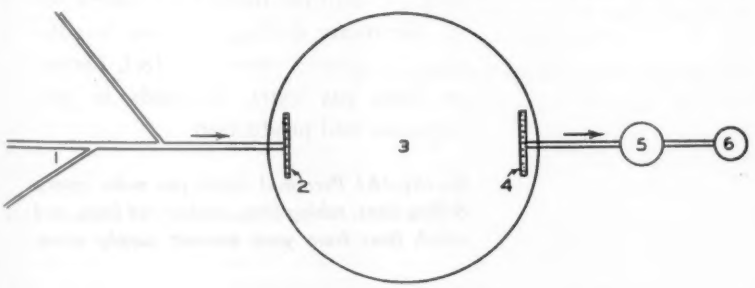


Fig. 2—Salt-water-disposal system in western Kansas

(1) Gathering lines from field separators.—These are usually of cement-asbestos or asphalt-fibre composition, or cement-lined pipe. **(2) Inlet spreader.**—This is usually a section of perforated pipe, located near bottom of the tank. **(3) Gathering basin.**—This may be either concrete or the bottom two rings of a 55,000-bbl. steel tank. Capacity usually ranges from 5,000 to 15,000 bbl. Some cement basins are baffled to aid separation of traces of oil and heavy suspended matter. Steel basins are usually not baffled. However, one major company uses a spreader around entire perimeter of tank, the outlet being through the center round opening or baffle. Some companies prefer a cover on the gathering basin since this affords protection against aeration and windborne sediment. Oil is not considered to be protection against aeration. Oil on top of the gathering basin actually seems to be objectionable in the case of open basins, since it collects dust and then settles. **(4) Outlet spreader.**—This is usually identical to the inlet spreader but situated about 3 ft. down from the top of the waste brine. **(5) Filter.**—May be cotton flannel, porous disk, or slow sand type. If gathering basin is sufficient size, the filter is not necessary for successful disposal into Arbuckle dolomite. **(6) Disposal well.**—Usually bottomed in Arbuckle limestone, equipped with cement-lined tubing and packer. Disposal wells often take water by gravity. One major company has put in excess of 20 million barrels of waste brine in one Arbuckle disposal well without reconditioning the well. Filtration is not practiced at this well.

It seems probable that either the water from the well or the waste brine would have caused no scale if used alone. The unstable mixture, having a stability index at unity, was caused by mingling the two waters. This occurrence strongly indicates that flooding water, of stability index 1.0, is not entirely suitable for injection into a sand formation.

Waste brine is usually rather stable if contact with air is largely prevented. Aeration, agitation and reduction of pressure are factors which combine to produce instability, or a state of precipitation, in many waste brines. Once this state is present, it is quite persistent and the precipitation of scale-forming material is very difficult to bring to completion. Waste brine injection has been used successfully for several years in western Kansas oil fields as a means of salt-water disposal. During the first few years of this practice, some operators attempted to "stabilize" the brine by aeration and filtration. Tests for stability were made by the now obsolete "marble test" and it was never agreed whether the brine was rendered more stable or less so by the treatment. Aeration of waste brine has been discontinued in all western Kansas fields. Observations on injection wells show that well plugging takes place at a slower rate when aeration is not used. The following analyses and calculations fully justify the conclusions which have been heretofore based only on observations of field tests:

WASTE BRINE INJECTION, ELLINWOOD, KANSAS

	Waste (Arbuckle) brine from separator	Treated brine, aerated and filtered
Ca, as $CaCO_3$, p.p.m.	1,750	1,450
Total alkalinity, as $CaCO_3$, p.p.m.	450	150
Total solids, p.p.m.	17,000	17,000
pH (determined)	6.7	7.9
pH_s at 100° F.	5.9	6.5
Stability index at 100° F.	+0.8	+1.4

The increase in scale-forming tendency is caused mainly by the rise in pH, which is in turn largely due to loss of CO_2 during the aeration process. The total alkalinity, as $CaCO_3$, would have to be lowered to approximately 8 p.p.m. for the treated water to be entirely stable at 100° F. This is not feasible by aeration. Lowering pH value of the treated water to 6.5 would render it stable for injection at well temperature of 100° F. This would be quite expensive on large volumes of water. It follows, therefore, that the most practical and economical method for injecting this waste brine is that of using a closed system. The latter method, if properly applied, protects against loss of CO_2, thus preventing rise of pH, and holds scale precipitation to a minimum.

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The MER for Displacement of Oil By Water Above Saturation Pressure

*by Park J. Jones**

THE OPTIMUM RATE OF PRODUCTION

PART 3 OF A SERIES

THE optimum rate of production from reservoirs usually does not exceed the maximum efficient rate, the MER. The MER for displacement of oil by water may be variously expressed. But the rate of advancement of oil-water interface parallel to bedding probably has more applications than any other method. Field experiences with displacement of oil by water under various conditions indicate that 200 ft. per year parallel to bedding is about the maximum rate of interface advancement for most reservoirs. However, an exceptionally cavernous limestone reservoir and a homogeneous sandstone reservoir, if one were discovered, could have a faster rate of water advancement without bypassing oil. The rate of oil production, the MER, corresponding to a 200-ft.-per-year rate of interface advancement depends primarily on areal and sectional convergence of reserve. The MER may influence the size of an initial oil reserve and well-producing capacity. The latter, in turn, influences investments in reservoirs and operating expenses. For these reasons, the MER is a significant element in producing some reservoirs at optimum rates. This article is limited to displacement of oil by water at reservoir pressures which are higher than the saturation pressure for oil. The corresponding MER for linear and radial reservoirs is illustrated by examples.

THE MER for displacement of oil by water may be variously expressed. But the rate of advancement of oil-water interfaces parallel to bedding probably has more applications than any other method. Field experiences on displacement of oil by water under various reservoir conditions indicate that 200 ft. per year parallel to bedding is about the upper limit of interface advancement for most reservoirs. However, some cavernous limestone reservoirs may have a faster rate of interface advancement without bypassing oil. A homogeneous sandstone reservoir, if one could be discovered, would also have a faster rate of interface advancement without bypassing oil.

The rate of oil production, the MER, corresponding to a 200-ft.-per-year rate of interface advancement depends on several factors. These include structure, stratigraphy, porosity, viscosity, and volume factors for oil.[1] These factors make for a wide range of MER as between reservoirs. In addition, the MER for a given reservoir may vary from year to year. The annual rate of oil production at MER from a given reservoir depends on the areal and sectional convergence of reserve. Convergence of reserve was considered in Part 2 of this series.

*Production consultant, Houston.

Horizontal Distance vs. Dip of Pay

The horizontal distance, in a direction at right angles to the strike of a pay, which corresponds to 200 ft. parallel to bedding depends on the dip of pay. Two hundred times the cosine of a dip angle is the horizontal distance. For example, a 250-ft.-per-mile dip is 2° and 43′. The cosine of 2° and 43′ is 0.9988 and 200 (0.9988) is 199.8 ft. of horizontal distance. In this example, the horizontal distance is practically the same as 200 ft. parallel to bedding. For the purposes of this article, we assume that the dip of pay is small and that the cosine of dip angles is practically equal to one. In practice, the effect of dip on the MER is absorbed in preparing oil recovery maps like the one shown in Fig. 1 of Part 2 of this series.

The MER for a Linear Reservoir

Consider a linear reservoir. Let H denote the horizontal distance from the initial position of the oil-water contact for the reservoir to the structurally high productive limit. Let the dip be negligibly small. Then 200 ft. parallel to bedding is almost equal to 200 ft. in a horizontal plane. Let E denote the maximum efficient rate of oil displacement by water from a reservoir in barrels per barrel per year of an initial reserve. Then for a uniform distribution of pay thickness and porosity, the MER would be de-

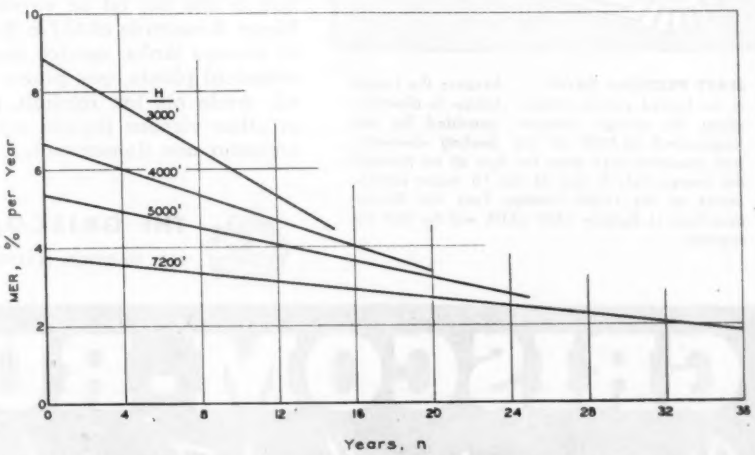

Fig. 3-1—Illustrating the MER for linear reservoirs having a twofold decrease of pay thickness vs. the life of reserve at MER and H the distance from the initial position of an oil-water contact to the structurally-high productive limits

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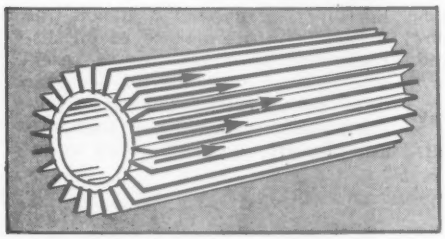

LEAST PRESSURE DROP . . . because the liquid to be heated passes without change in direction along the straight channels provided by the longitudinal G-FINS of the heating elements, with maximum free area for flow of oil through the heater. This is one of the 10 major superiorities of the G-Fin Storage Tank Oil Heater described in Bulletin 1641 which will be sent on request.

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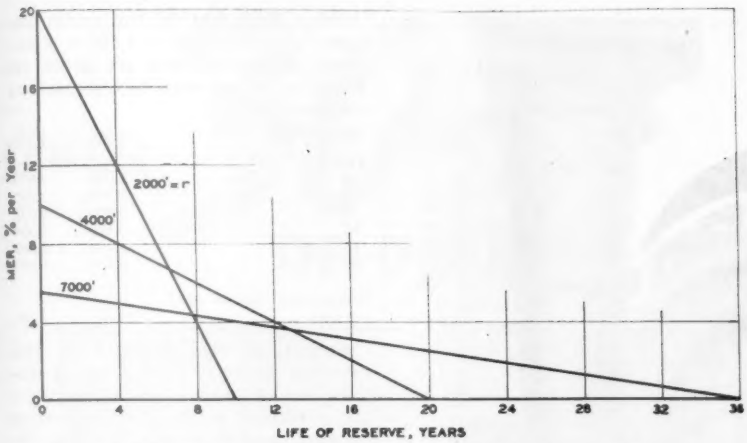

Fig. 3-2—The MER for displacement of oil be water from radial reservoirs vs. the life of reserve at MER and radial distance r to the initial position of an oil-water contact; pay thickness is uniform; no primary gas cap

fined by:

$$E = \frac{200}{H} \qquad (1)$$

In this case the MER would be independent of time. For example, if H were 4,000 ft., the MER at any time would be 200/4,000 or 5 per cent per year. The life of a reserve would be 20 years. If the initial reserve were 40,000,000 bbl., the annual rate of production would be uniform and equal to 2,000,000 bbl. per year or 5,500 bbl. per day.

However, suppose pay thickness decreases in the updip direction. For illustrative purpose, let there be a uniform twofold decrease of pay thickness in going from the water contact to the structurally high productive limit. The position of the oil-water interface at any time n relative to the initial position would be 200n/H, where n is time in years. The pay thickness at the position 200n/H relative to the pay thickness at the position for n = 0 is given by:

$$h = 1 - \left(\frac{100n}{H}\right) \qquad (2)$$

Upon multiplying the right side of Equation 1 by that of Equation 2 and dividing by the average pay thickness (1 + 0.5)/2 or 0.75, we obtain:

$$E = \frac{800}{3H^2}(H - 100n) \qquad (3)$$

Equation 3 includes the areal factor 200/H. There is no areal convergence or divergence in this example. So the areal factor 200/H does not vary with time. The sectional factor (4) (H — 100n)/3H decreases in this example, Fluids converge sectionally because pay thickness decreases. More generally, the MER for a linear reservoir, and for that portion of a reservoir which may be linear, is defined by the product of a uniform areal factor and a sectional factor. The sectional factor usually varies with time, that is, oil recovery either increases or decreases per foot of interface advancement.

The lines in Fig. 3-1 are solutions of Equation 3. The maximum efficient rate E, in per cent per year of initial reserve, is plotted against the life of a reserve produced at MER. The sectional convergence is uniform and equal to two, that is, the example is for a two-fold decrease of pay thickness and the decrease of pay thickness is uniform in going from the initial oil-water contact to the updip productive limits. In this example, the life of a reserve at MER is equal to H/200. The initial MER, that is, when n = 0, is 800/3H. The final MER, that is, when n = H/200, is 400/3H. We might note that for uniform pay thickness, the lines in Fig. 3-1 would be horizontal. For increasing pay thickness, sectional divergence, the lines would slope upward rather than downward.

An Example on Linear Reservoirs

The initial oil reserve for a linear reservoir is 40,000,000 bbl. Estimate the MER by 4-year intervals if the conditions are as follows: (1) A twofold decrease of pay thickness between the initial position of the oil-water contact and the updip pro-

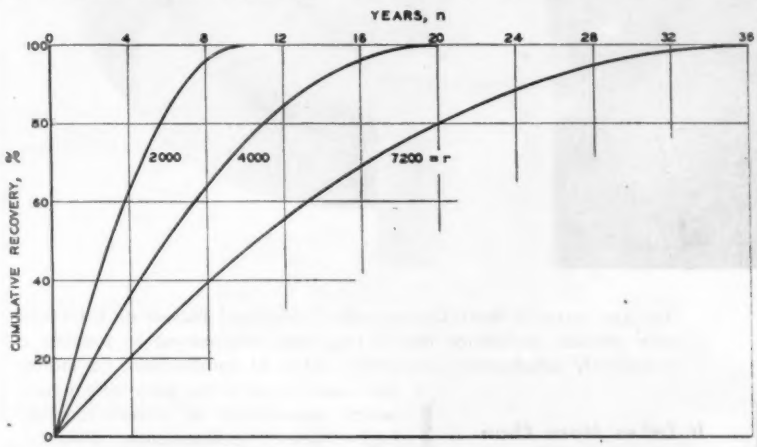

Fig. 3-3—Cumulative recovery in per cent of initial reserve for displacement of oil by water from radial reservoirs at MER; pay thickness is uniform; no primary gas cap

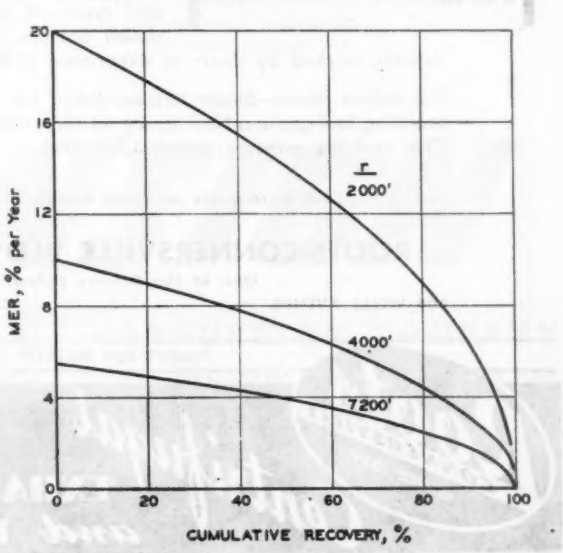

Fig. 3-4—The MER for displacement of oil by water from radial reservoirs vs. cumulative recovery in per cent of initial reserve; pay thickness is uniform; no primary gas cap; r is the average radial distance to the initial oil-water contact

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ductive limit and (2) the updip distance is either 4,000 or 8,000 ft. Solutions of this example are given by Equation 3 and may be itemized as follows:

Updip distance, ft.	4,000	8,000
Years	—Bbl. per day—	
0	7,300	3,650
4	6,600	3,300
8	5,800	2,900
12	5,100	2,550
16	4,400	2,200
20	3,650	1,800
Remaining life at MER, years	None	20

Conditions are identical in this example aside from the initial distribution of reserve. Both reservoirs are produced at equal initial rates of water encroachment. But the life for the 4,000-ft. reservoir at MER is 20 years and that of the 8,000-ft. reservoir, 40 years. This difference stems from initial distributions of reserve. The foregoing considerations are aside from well-producing capacity. A reservoir is said to have a MER even if no wells are drilled.

The MER for Radial Reservoirs Having No Sectional Convergence

In order to illustrate the MER for radial reservoirs, we assume uniform pay thickness, no sectional convergence of reserve. Under this condition, reserve converges only areally in the updip direction. Let r be the average radial distance to the initial position of the oil-water contact. The position of the oil-water interface at any time n is given by (r — 200n) where n is time in years. The length of the interface is proportional to 2 (r — 200n). The total reserve is proportional to r^2 and the rate of interface advancement is 200 ft. per year. Hence the MER is defined by:

$$E = \frac{400}{r^2}(r - 200n) \qquad (4)$$

where E is the MER in barrels per year per barrel of initial oil reserve in radial reservoirs having no sectional convergence of reserve and no primary gas cap. The straight lines in Fig. 3-2 are solutions of Equation 4. The MER, in per cent per year of initial reserve, is plotted against the life of a reserve produced at MER. The initial MER is equal to 400/r. The life of a reserve produced at MER is equal to r/200.

An Example for Radial Reservoirs Having No Sectional Convergence

The initial oil reserve for a radial reservoir is 40,000,000 bbl. Estimate the MER by 4-year intervals if the conditions are as follows: (1) No sectional convergence of reserve, and (2) the radial distance to the water contact averages either 5,000 or 10,000 ft. Solutions of this example are given by Equation 4 and may

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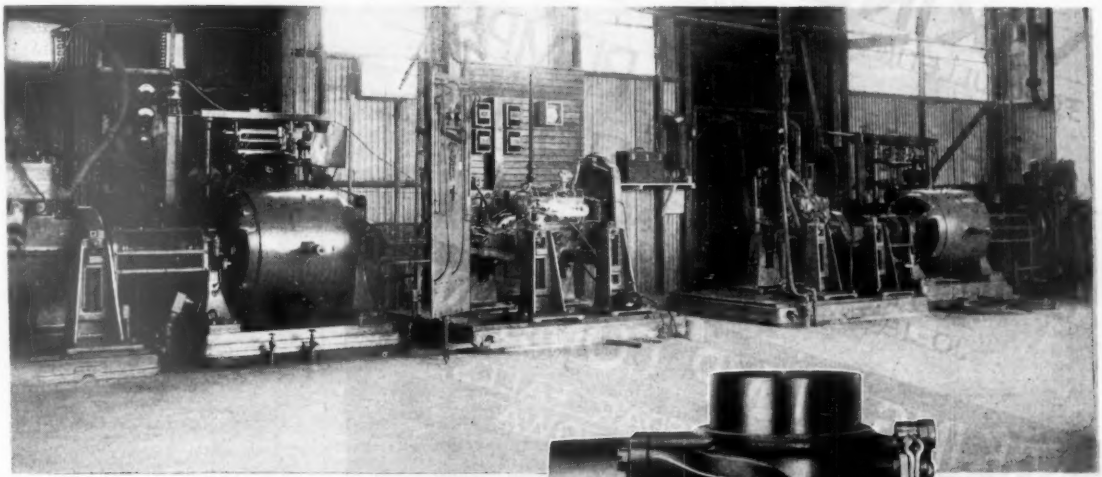

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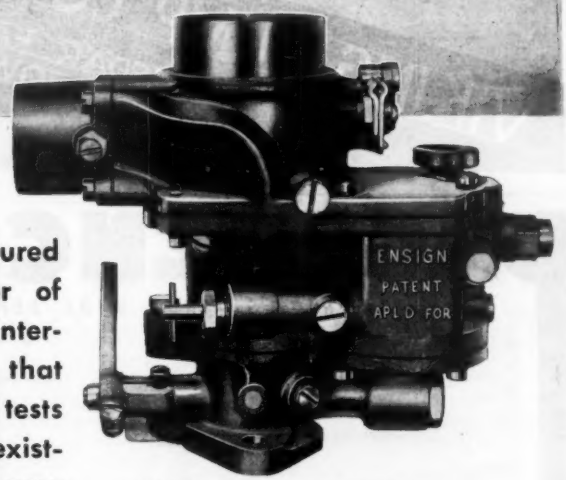

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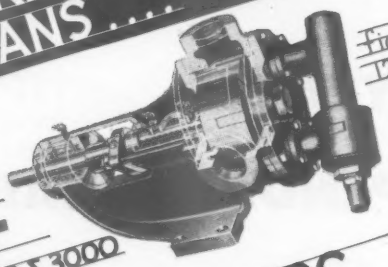

Fig. 104

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be itemized as follows:

Average distance to water contact, ft.	5,000	10,000
Years	Bbl. per day	
0	8,800	4,400
4	7,350	4,050
8	5,950	3,680
12	4,900	3,330
16	3,500	2,980
20	2,100	2,630
Remaining life at MER, years	5	30

Conditions are identical in this example aside from the initial distribution of reserve. Both reservoirs are produced at equal rates of water encroachment. But the life for the 5,000-ft. reservoir at MER is 25 years and that of the 10,000-ft. reservoir, 50 years. Difference stems from initial distribution of reserve.

The Cumulative Recovery at MER

The cumulative recovery C at MER by the end of the nth year is equal to the sum of the going rates of production. In the case of radial oil reservoirs having no sectional convergence and no primary gas cap, it can be shown that the cumulative recovery is defined by:

$$C = \frac{400}{r^2}(rn - 100n^2) \qquad (5)$$

The curves in Fig. 3-3 are solutions of Equation 5. Cumulative recovery, in per cent of initial reserve, is plotted against the life of a reserve produced at MER.

The MER vs. Cumulative Recovery

The rate of production E divided by reserve (1 — C) is equal to the rate of depletion R. So it follows that the rate of depletion accompanying the MER for radial reservoirs having no sectional convergence and no primary gas caps is defined by:

$$R = \frac{400}{r(1 - C)^{0.5}} \qquad (6)$$

The rate of depletion in this example is inversely proportional to the square root of reserve. Hence, the MER for displacement of oil by water from radial reservoirs is accompanied by increasing rates of depletion. The curves in Fig. 3-4 are convex upward. A straight line connecting the initial point and any other point on a given curve would fall below the curve. These data are for uniform pay thickness. Sectional convergence, or divergence, should be superimposed on areal convergence. In practice, areal and sectional convergences are usually nonuniform. So data like those shown are obtained from oil recovery maps, with the aid of a planimeter.

Reference

1. The Oil and Gas Journal, Mar. 17, 1945, p. 107.

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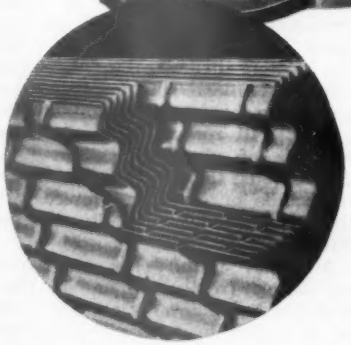

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A brief description of the principle of operation of a time-impulse system is perhaps in order. Its essential elements consists, first, of a transmitter that varies the length of an electrical impulse in relation to the magnitude of the primary information which might be pressure, flow, or degree of opening (as in a valve); second, a conveying channel for the impulse; and third, a receiver that utilizes the length of the impulse to position a pen arm which in turn draws the record on a chart, in the case of a recording instrument.

*Pacific Gas & Electric Co. Paper presented at transmission conference, Pacific Coast Gas Association, Fresno, Calif., March 1945.

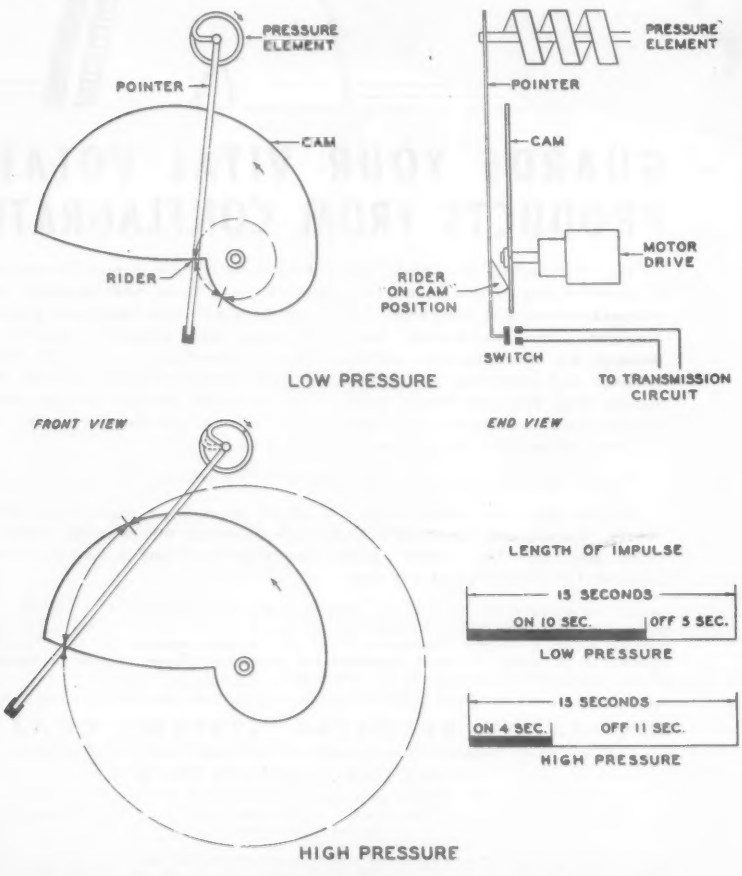

Fig. 1—Transmitter

More specifically, the transmitter consists of a cam which revolves at the constant rate of one complete turn every 15 seconds. The drive usually consists of a synchronous motor although any accurately timed motivating power would suffice. No synchronizing is required with the remote receiver, only accurate timing of revolution, a very important feature of this system. In the case of a pressure instrument a pointer extends from the element, on the end of which is a wedge-shaped rider. When the rider is on the cam an electric switch is opened; conversely when it is off the cam the circuit is closed. The length of time the switch is closed as compared to the length of time it is opened determines the duration of the "impulse". Fig. 1 illustrates the device in diagrammatic form.

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2. Signal circuit channels which are leased from telephone or telegraph companies are usually made up of a pair of wires. This follows the practice of communication utilities of assigning "pairs" to each subscriber. The advantage of this arrangement lies in the fact that complete electrical impulses are within the wired circuit. Minimum of current losses which in turn permits longer distances are the principal features gained.

3. Ability to use two complete telephone channels in a two-wire circuit which is normally designated for the use of one, is a development of many years' standing. It is referred to as a "simplex circuit." Essentially, the pair of wires is broken into at each end by devices which are called insulating transformers. Their function is to isolate that por-

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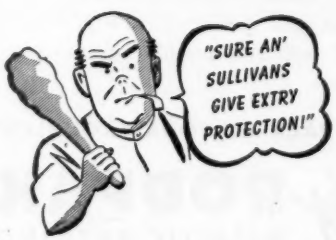

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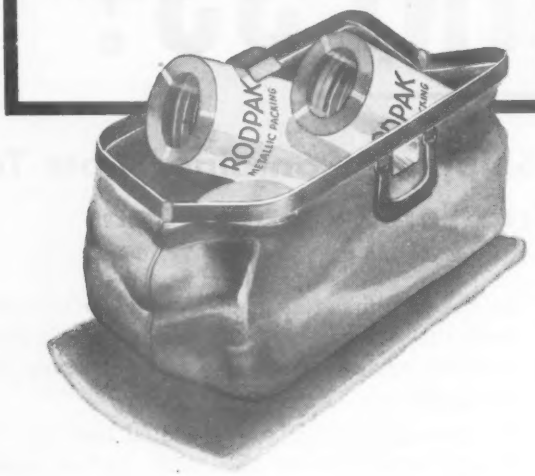

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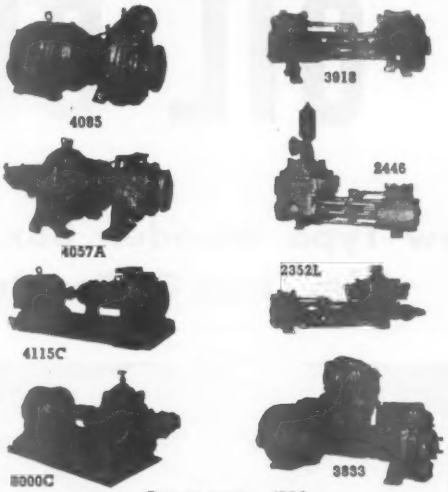

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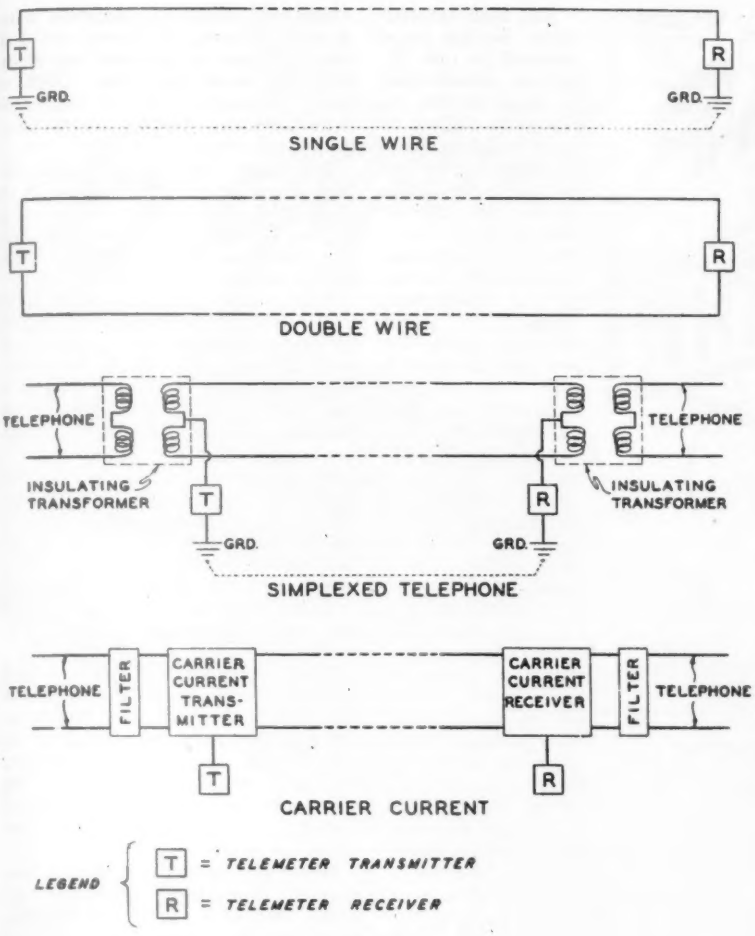

Fig. 2

tion of the line in question, thereby creating by the use of a ground return a separate and distinct channel. Thus it is possible to carry on a conversation in the telephone circuit and at the same time permit the transmission of a telemetering impulse.

4. One of the magic words of modern engineering is "electronics." The whole concept of a carrier current system can be compared to a network of transmitting radio stations with an equal number of receivers tuned to the various emitting stations. It is conceivable to have several receiving sets in one room going at once but adjusted to different programs. Each station's reception in itself would be received with distinct clarity without interference from the others. If instead of voices or music originating from the transmitting station there is a single impulse or dash, the receiver sound is that of a single impulse or dash. Thus if the length of the impulse is controlled by the telemeter transmitter, there are elements of a telemetering system.

While it is quite practicable to use radio in this manner, the lack of directional control limits its general application.

The term carrier current derives its name from the method used to institute a carrier which will have directional effects. In ordinary electrical power lines the current moves along the wire rather sluggishly compared to the speed at which some radio waves travel. It is this difference of phenomena that is the basis for carrier current transmission.

A hydraulic analogy can be drawn to illustrate the underlying fundamentals that make this idea possible. Fig. 3 shows the plan of development.

As a first premise, there may be a pipe line available to which it is desired to apply a carrier-current system. Second, within this pipe there can be a fluid, possibly water, that can move under various conditions of rates of flow or direction.

Application of Devices

The application of devices to this pipe line would consist, first of a baffle arrangement so proportioned that when the maximum velocity of the water flowing is reached there would be very little impediment. However, under conditions of flow, let us say, of a thousand times greater than the above mentioned normal maximum it is understandable that there then would be a tremendous resistance offered by these baffles, a point to remember as the discussion develops. One of these baffle arrangements would be placed at each boundary limit of the transmitting and receiving stations, that is, upstream of the point of origin of the information to be sent and one downstream at the point to which it is desired to send the message.

Suppose next that the main pipe line is cut into and that attached to this opening is a large-diameter nozzle. Across the outer end of the nozzle is placed a flexible diaphragm. This diaphragm in turn is supported by a spring which is ad-

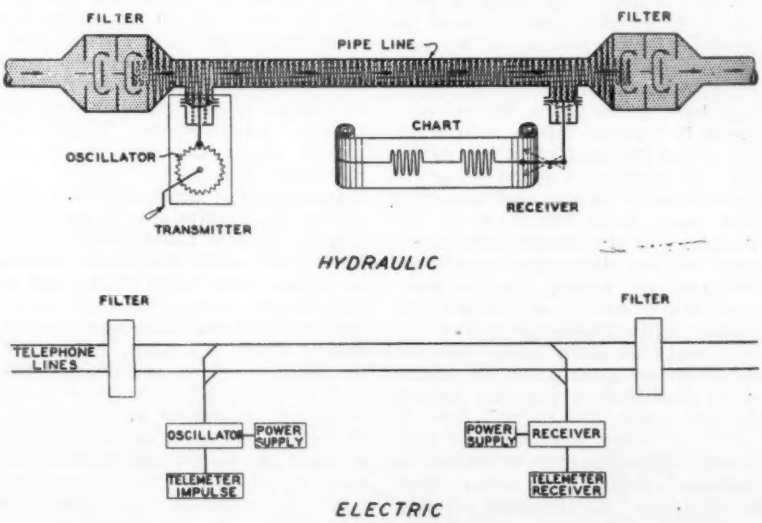

Fig. 3

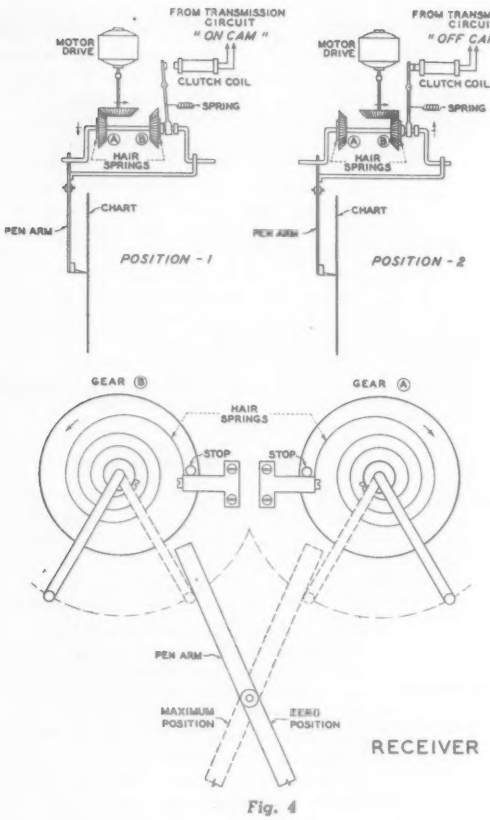

Fig. 4

justed to balance the static pressure condition of the fluid. Attached to this diaphragm is a stem which terminates in a roller, the roller being in contact with a pointed-toothed wheel which can be revolved by a crank. These parts constitute the transmitter.

The receiver would be similarly constructed of a nozzle attached to the pipe with a spring-loaded diaphragm. This stem, however, would have its lower end connected to a pivoted penarm. By using a strip chart, a graphic record could be made of the movements of the pen.

To accept this analogy, many liberties to practical physical construction have to be taken. We are now ready to transmit information. First let us test the equipment by revolving the crank at a speed of say 10 revolutions a second, and assuming that there were 100 teeth on the periphery of the wheel; 1,000 vibrations of the diaphragm would be produced per second. Such a pressure wave would so exceed the ability of the baffles, or rather the resistance to such high velocity would be so great, that few waves could pass beyond the first baffles All the while, the normal flow of water is being permitted to pass freely. This baffle arrangement could be referred to as a filter, that is, it strains out the high velocity permitting the lower velocity to pass through.

The high-velocity wave having been stopped in one direction would tend to move swiftly in the direction of least resistance until finally impeded by the baffle filter at the far end of the pipe line. Waves, however, would strike the receiving diaphragm which in turn would cause the pen arm to draw a picture of this movement on the passing chart.

To utilize this effect for telemetering, it is merely necessary to revolve the crank of the oscillator (at a speed of 10 r.p.s.) for a period of time as determined by the pressure transmitter as shown in Fig. 1. For example, in the case of "low pressure" the rider might be on the cam 10 seconds during which time the distant pen arm would be drawing a straight line, then for 5 seconds the toothed wheel would revolve producing a picture of vibrations on the chart for that period. Under a condition of "high pressure" as illustrated, the straight line would be 4 seconds long and the graph 11 seconds long. Thus from this timing effect the magnitude of pressure could be correlated.

Carrier-Current System

An electrical carrier-current system is made up of essentially the same named devices. Filters which serve as electrical baffles permit the slower speed waves to pass through but serve as an impedance to the higher speed waves. These are placed across the line as in our hydraulic analogy.

Instead of a notched wheel producing the vibrations, a combination of vacuum tubes creates oscillations of radio frequency which are many times faster than those of the electric current normally flowing in the lines. This apparatus is known as the oscillator. As part of the oscillator there is built into the unit an integral power supply for the tubes. Inasmuch as the amount of current required for these units is small, the source can be obtained from an ordinary 110-volt a.c. circuit. The standard assembled sets that we use for simple carrier frequency work are made up to include two bands of operation within each housing. By being tuned to two different frequencies two channels are made available. Both of these channels can be operated simultaneously without interference with each other.

The space required for each cabinet being about 20 by 8 by 9 in. deep, it is merely necessary to plug in the 110-volt source on one side, the telephone line and the impulse circuit on the other side.

There is no practical limit as to the number of channels obtainable by carrier current; the present economical limit is 25. When the number of channels exceeds three it is then more practical to approach the problem in a slightly different manner, this difference being more a matter of radio engineering than of principle. Pacific Gas and Electric Co. now has under construction a carrier system involving 15 different and separate functions. Thus it is seen from this review of channel ways that there are many plans that can be used to transmit information.

While the discussion started with a detail description of the telemeter transmitter that instituted the original impulse, then progressed to an explanation of channels, nothing has been mentioned regarding the mechanics whereby this received "impulse" is converted to a final record of pressure.

Fig. 4 shows a diagram of a mechanical simplified telemeter receiver. By deviating in the drawing from actual construction details, a better word picture can be given of the important elements of this unit. As with the telemeter transmitter there are certain essentials that make these devices workable which in themselves contribute nothing to the basic principles.

The telemeter receiver depends upon an accurate timing device to drive the gearing. The simplest available timer of this character is a synchronous motor of the "clock" type. It must be again emphasized that this system does not require synchronizing between transmitter and receiver. The requirement is only accurate timing. A synchronous motor is used only because by its inherent characteristics it gives a constant rate of revolution. At the end of the motor shaft is a bevel gear. Two more bevel gears are arranged on a shaft such that they can revolve freely and independently from each other. This gear mounting is designed so that it may be shifted from one position or the other thus engaging gear "A" or gear "B." The shifting is accomplished whenever the clutch coil is energized, at which time gear "B" is in mesh with the motor driven gear. During the de-energized period gear "A" is held in contact with

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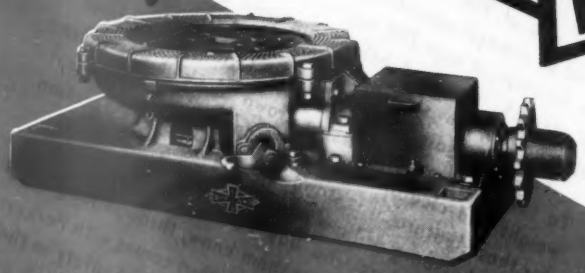

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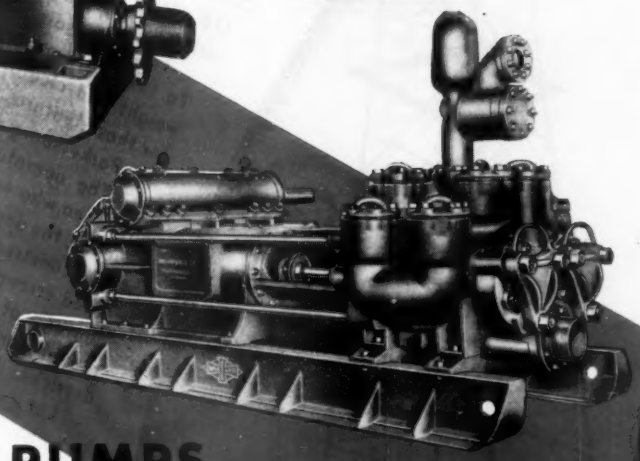

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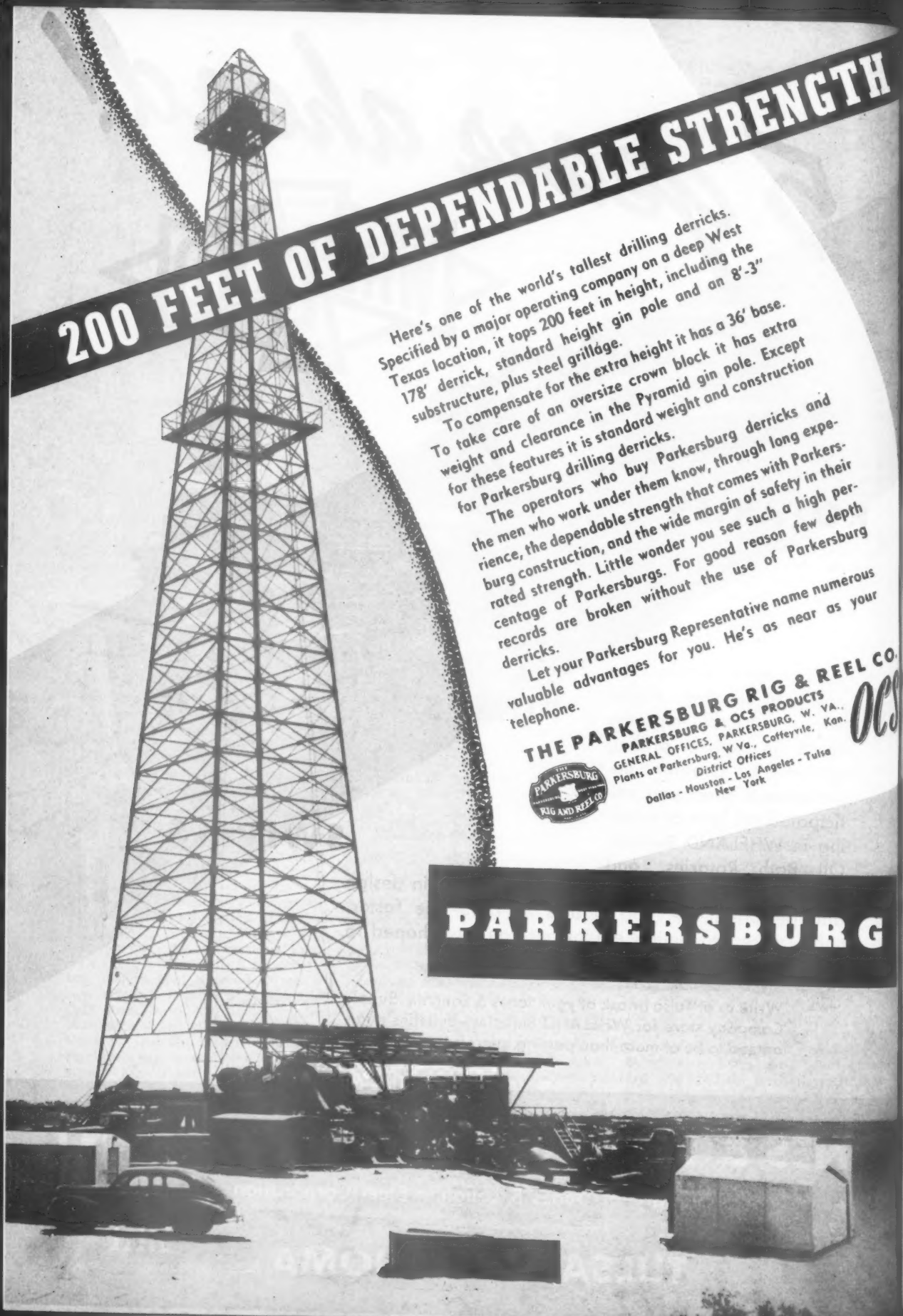

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the motor gear by means of a spring.

Reference to the enlarged detail of the gears "A" and "B" will disclose further important features. When either gear is disengaged it is held against a stop by an involute spring. During the meshing period this spring becomes in tension; when released it returns the bevel gear against the stop. Attached to each gear is a crank arm which extends downwardly; whenever the gear is revolved this arm moves simultaneously with it. The lower end of the arm is placed to engage the upper end of the curve-drawing pen arm which is pivoted.

The clutch coil receives its impulse from the transmitter and operates in accordance with the definite time cycle as established by it, which is divided into two periods—the "off-cam" and the "on-cam." During the on-cam interval gear "A" is in contact with the motor-driven gear and is tending to drive the pen arm towards the bottom of the chart. While in the off-cam position the clutch coil receives the impulse, shifts the gearing to engage gear "B" with the motor gear. When this happens the pen arm is moved toward the top of the chart. As previously explained, the relationship of the off to on periods will be determined by the magnitude of the pressure. By the alternate attempts of the gears "A" and "B" to reposition the pen arm it is possible to reproduce accurately the pressure condition existing at the transmitter. As an example, suppose that the pressure is remaining constant; the rider in the transmitter would lift the pointer breaking the impulse, the spring on the clutch coil would cause gear "A" to engage the motor drive. Gear "A" would commence to move away from its stop but just as it reached the pen arm the transmitter rider would drop from the cam thus closing the impulse circuit. At that instant the clutch coil would shift the gear "B" to engage the motor drive, gear "B" would then move from its stop, revolve and attempt to move the pen arm to the top of the chart. But again, just as the gear arm engages the pen arm, the circuit is broken and no movement is made. Thus as long as there is no pressure change there will be no variation of the record. However, with the slightest change in pressure which will upset the previous relationship of off-cam to on-cam the pen arm will be shifted to respond.

With the transmitter cam revolving at the rate of once every 15 seconds there is an integration which appears as a continuous line on the average 24-hour chart.

The indicating and recording of distant conditions of flow and pressure excite the desire for remote control. In fact, one of the most useful functions of telemetering is to show the effects produced by changes instituted at the point of origin of flow but equally useful is the recording of changes which have been effected at a remotely controlled station.

Gas transmission lines by their very nature of length introduce time lags in pressure effects which aggravate the problem of transport. More complexities are added when several lines originating at different sources converge at a common station. When large, separated load centers are fed from the same field, conditions of sudden demand changes are often troublesome to accommodate.

Remote Control

The same type of wires or channels which serve for telemetering can also be used for remote control. An impulse can be instituted at a point of origin to cause the change in a valve position or a pressure setting in a controller just as in the telemetering system it caused the positioning of a pen arm.

To better illustrate the possibilities and the extent to which such a combined system can be used, a description of the latest project of Pacific Gas and Electric Co. in this category will be given. Fig. 5 shows the elements of the plan.

The Rio Vista gas field is divided into two areas which are separated by the Sacramento River. These areas are referred to as the West Field and the East Field. Three general territories are served from this group of wells, viz., Sacramento Valley and North Bay, the San Joaquin Valley, and the San Francisco Bay gas demands. Located to the south of the Rio Vista field on the route of the transmission line feeding the bay area is a control station called the Antioch gas terminal.

In the West field is the producer's office and headquarters. At the "master meter" station is an orifice meter which measures the gas going to the west and to the north. At the "Isleton meter" station is an orifice meter and a control valve which handles the gas going in an easterly direction. To permit the balancing of loads between the west and the east portions of the field a control valve and an orifice meter are placed in the line which connects those two areas by a submarine crossing. This station is shown in

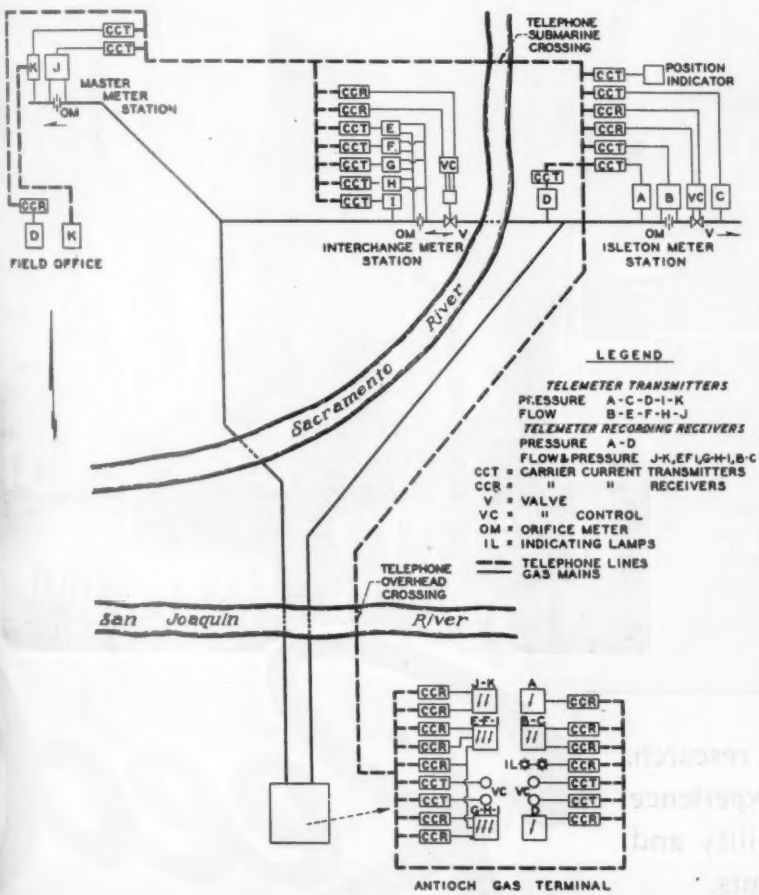

Fig. 5

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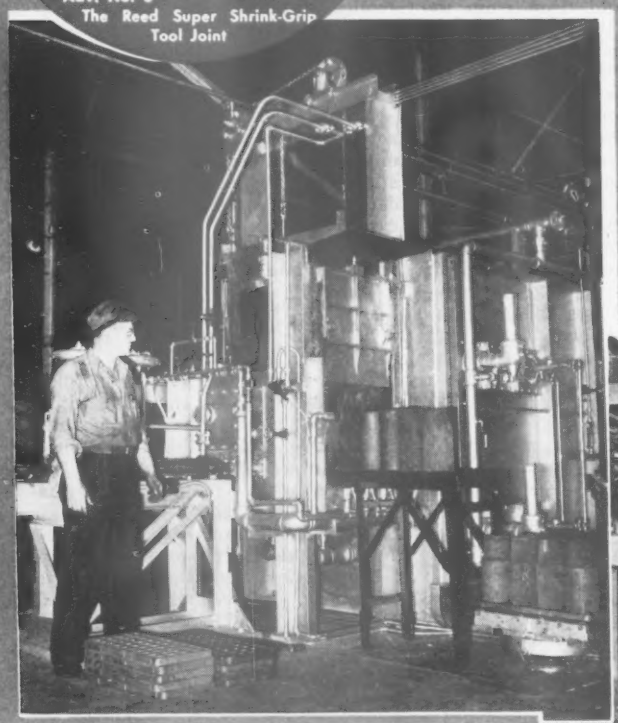

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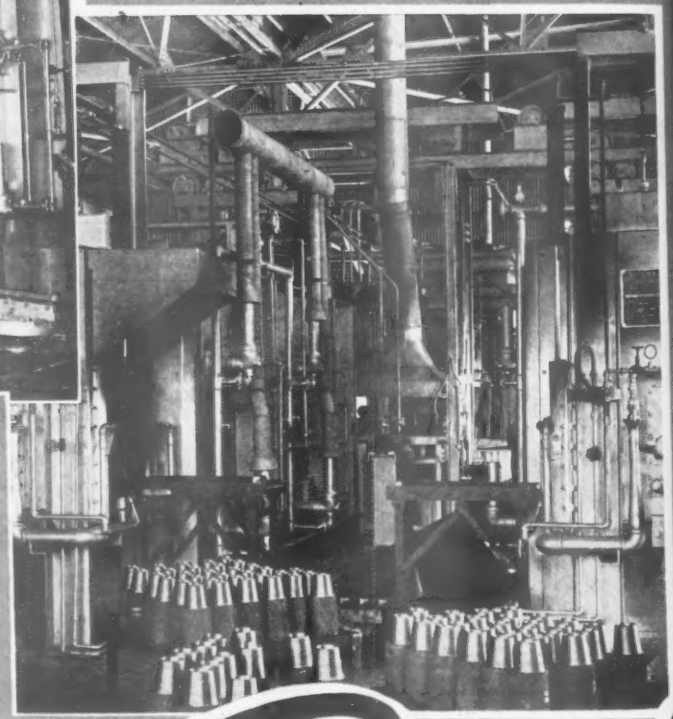

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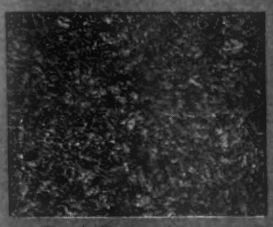

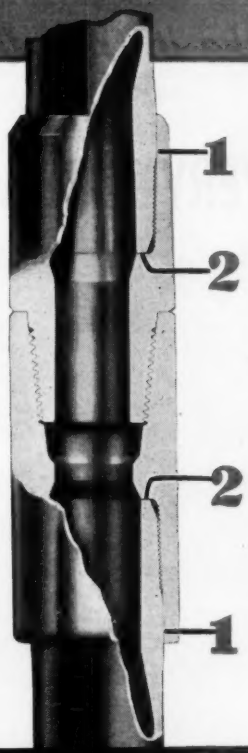

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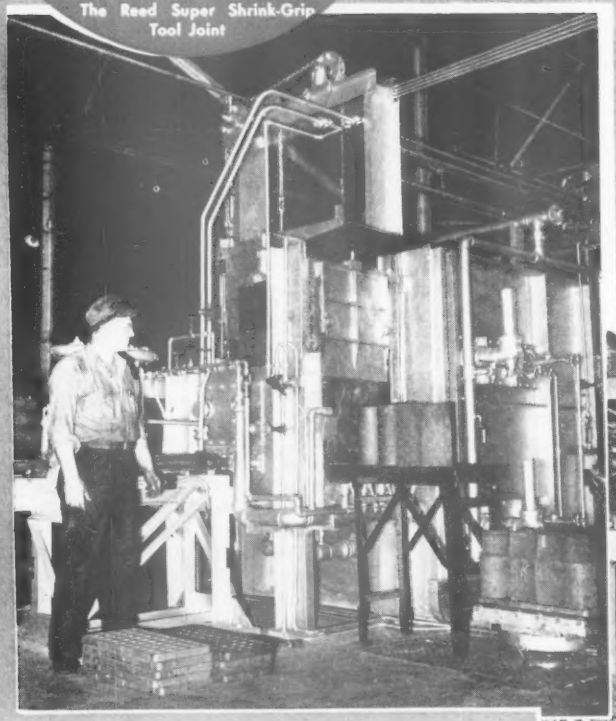

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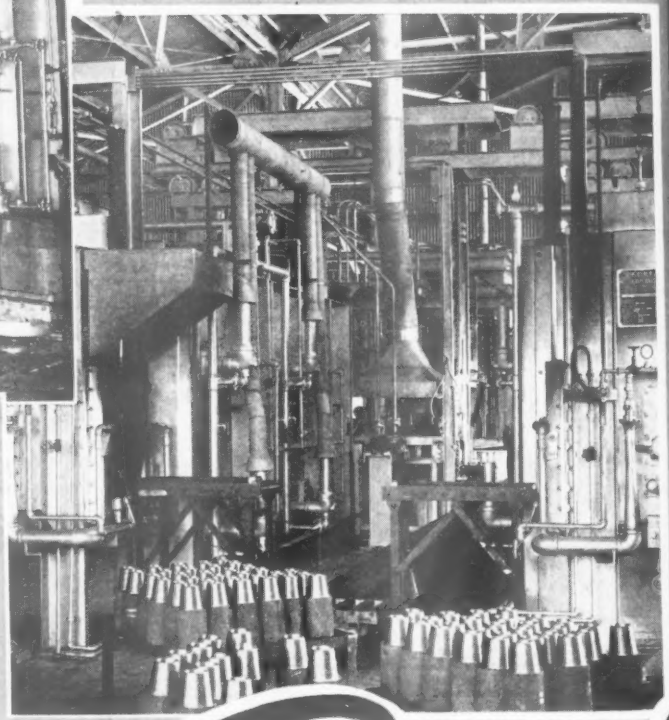

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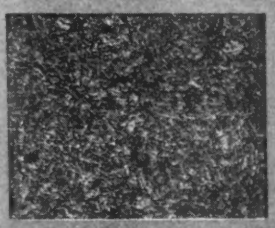

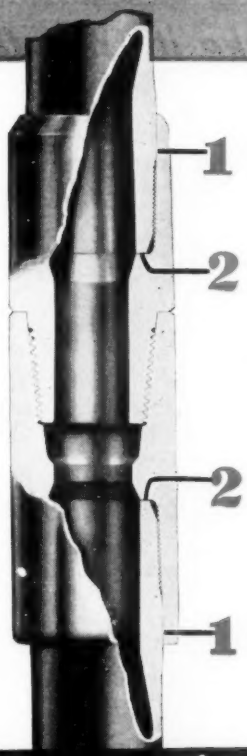

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Fig. 5 as the "interchange meter" station. Close to a point where the river crossing emerges is located a pressure recording station.

The whole telemetering and control network is referred to as the Rio Vista-Antioch system. Generally speaking, the telephone line parallels the main gas pipe lines. The two wires to which this system has been applied serves normally as a communications channel, tying into the vast telephone wireways of the company.

Carrier current transmitters and receivers have been applied to these existing wires. The Antioch station being attended 24 hours a day is the control center to which all the information is directed. All the remote control adjustments also originate from here.

The instrumentation (Fig. 5) more specifically is arranged as follows:

Master Meter Station

K—Pressure telemeter transmitter, 0 to 1,000 lb.

J—Flow telemeter transmitter, 0 to 100 in.

Field Office

K — Pressure telemeter receiver recording.

D — Pressure telemeter receiver recording.

Interchange Meter Station

I—Pressure telemeter transmitter, 0 to 1,000 lb.

E and G—Flow telemeter transmitter, 0 to 100 in.

E and H—Flow telemeter transmitter, 0 to 10 in.

Flow transmitters are arranged in pairs of 0 to 10 in. and 0 to 100 in. so as to measure the rate of flow regardless of the direction the gas is moving through the meter.

An electric-driven valve can be opened or closed to any degree upon the receipt of the proper signal in the carrier current receivers located here.

East Side Pressure Station

D—Pressure telemeter transmitter, 0 to 1,000 lb.

Isleton Meter Station

A—Pressure telemeter transmitter, 0 to 1,000 lb.

C—Pressure telemeter transmitter, 0 to 1,000 lb.

B—Flow telemeter transmitter, 0 to 100 in.

As this station is a line valve to which has been applied an air (actually gas operated) motor that is controlled by a pressure controller —in other words, it normally acts to maintain a downstream pressure setting similar to an ordinary reducing regulator. The setting of the control point is adjustable from Antioch.

There also are installed selecting devices which permit the control of this valve to be taken from the instrument and transferred to manual control allowing the operator at the remove station to set the valve opening to any degree. Thus he can control to establish a certain rate of flow through the station. Having a spare carrier-current transmitter at this location, it was utilized to indicate to the operator whether he was set up on automatic or manual control. Further, to prevent any unusual excessive flows through station in the event that electrical power failure has occurred, which might conceivably last some time, the wiring has been arranged so that the valve control will shut down. The procedure would be to have a man go to the station to check the conditions. He could upon arriving put the pressure controller into operation, setting the pressure to suit. When the electrical power is reestablished, the control would go by itself from this automatic control setting to the manual setting and would indicate the change at the control board at Antioch. Another safety wrinkle is designed into this arrangement such that having been on automatic control, there then followed a power failure and in the event that the electricity re-

(Continued on page 114)

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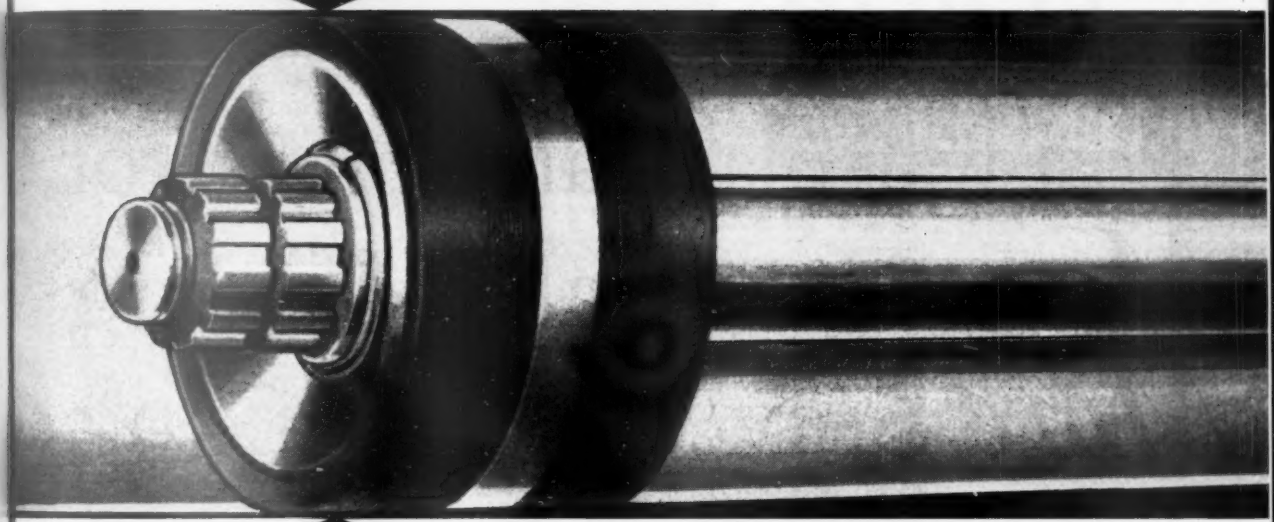

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More new units and more extensions of Furfural Refining and Solvent Dewaxing are being planned by leading oil companies than ever before in history. In the judgment of these companies, these two processes represent the best methods of meeting the growing demand for highest quality lubricating oil.

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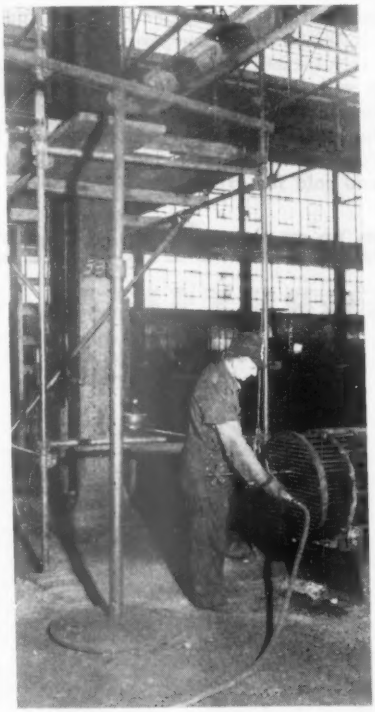
Motor Suspension Rack Lessens Difficult Task

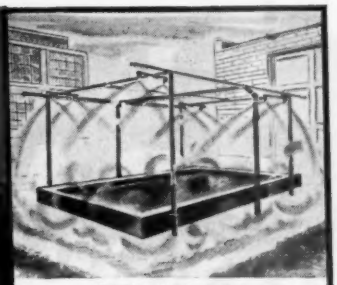
ROLLING exchanger tubes into a header is hard work, and supporting the heavy rolling motor is extremely tiring to the workman. To eliminate this, Standard Oil Co. of Indiana shop men devised a means by which the motor may be supported by a balancing weight while leaving it free to operate in any manner required.

In the illustration the base plate is a 2-ft.-diameter ribbed plate, but may be any disk of heavy sheet steel or any desired size. Fitted to the center of this plate is a 4-in. pipe 7 ft. long, drilled with ½-in. holes through both sides at 6-in. intervals. A 3-in. pipe about 6 ft. long slides

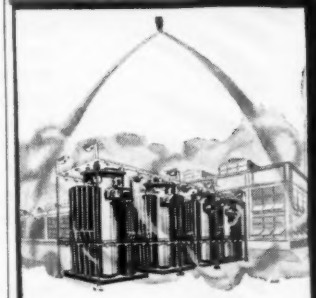


inside this 4-in. pipe section, and at the top at right angles are two pieces of ¼-in. to ½-in. by 3-in. sheet, spaced sufficiently wide to admit small pulleys on simple axles, at each end. A larger pulley is set into the upright pipe on extended flanges so that its inner circumference is approximately in the center of the pipe. A ¼-in. to ½-in. cable ending in a steel hook which hooks into a yoke fastened to the roll-in motor passes over the pulleys in turn at the ends of the overhead crossbar and through the larger pulley at the top of the vertical pipe, and is fastened to a counterbalance weight which hangs in the "well" of the vertical pipe.

How Do We KNOW that

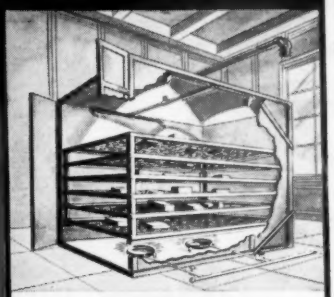


OPEN TANKS OF FLAMMABLE LIQUID



TRANSFORMERS

"AUTOMATIC" FIRE-FOG Quenches Really Tough Fires?



DRYERS AND OVENS

That's simple — we put FIRE-FOG to the test.

Here's what we do:

In our Test Yard at Youngstown we recreate actual conditions. If it's a question of extinguishing a quench tank fire, say, or a blazing transformer, we "set the stage" for the fire, exactly duplicating conditions where such fire hazards exist.

Then we know, almost to a second, how long it takes FIRE-FOG to quench fire; the most effective type and arrangement of FIRE-FOG nozzles; the amount of water used, etc.

Thus we eliminate guess-work. And what soul-satisfying comfort there is in the thought that FIRE-FOG is *automatic* in operation—an alert fire guard on duty 24 hours out of every day.

FIRE-FOG stops fires in Mixers, Coaters, Ovens, Dryers, Dip Tanks and flammable liquid processing, handling and storage facilities.

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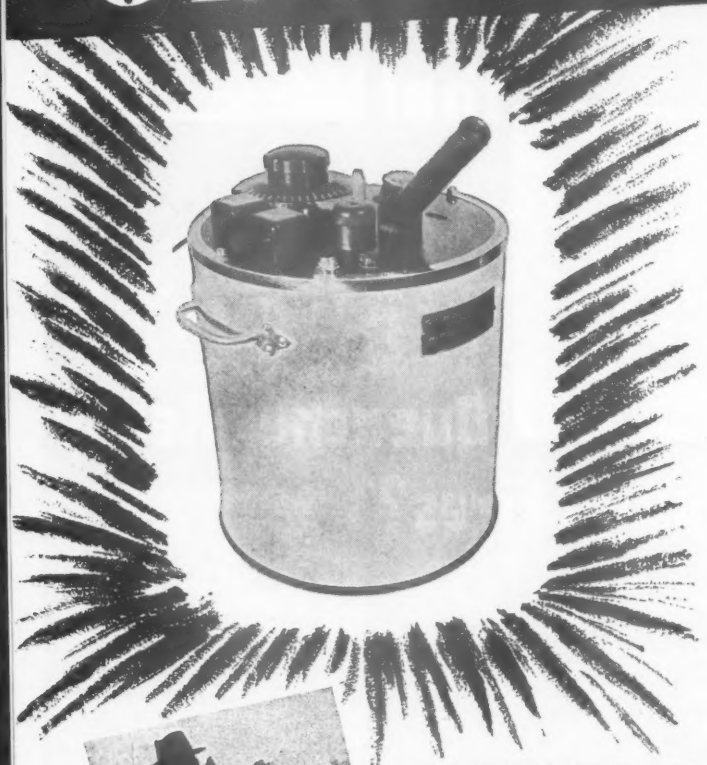
YOUNGSTOWN, OHIO . . . . . OFFICES IN 36 CITIES

"Automatic" Sprinkler manufactures and installs a complete line of fire protection devices and systems for all types of fire hazards. Listed by Underwriters' Laboratories and approved by Factory Mutual Laboratories.

VERSATILE GRAVITY METER



The advantages of this compact, lightweigh North American Gravity Meter are readily apparen when it is realized that one man can comfortably an easily carry it on his back with the special pac carrier. It can be carried into swamplands, throug dense undergrowth, over rugged mountain countr and any other terrain with ease and simplicity. It ca be mounted in an automobile for making convenien and rapid surveys in normal accessible areas. Wit the tripod extended through the floor of the car, it i not necessary to remove the meter to make a reading It can be transported in a canoe or small boat.

The meter weighs only 28 pounds. With back pack and battery the weight is but 45 pounds. Th meter is temperature compensated. The current re quired is sufficiently low, so that a single motorcycl battery will keep the meter unaffected by outsid temperature throughout the day.

Manufactured in our own laboratories, the Nort American Gravity Meter is leased for domestic oper ation and sold for export.

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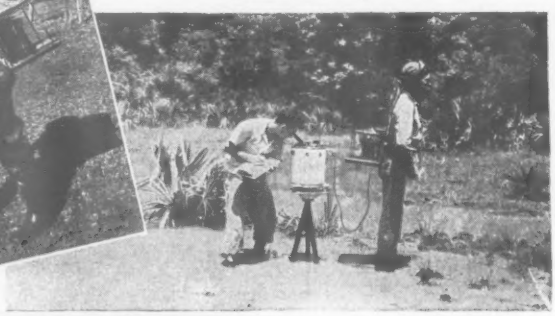
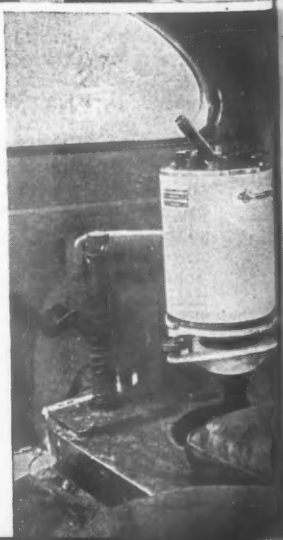
With the North American Gravity Meter in the back pack the crewman sets off for a location in swamp lands.



Two men in a small boat with outboard motor carry the North American Gravity Meter across a lake to make readings on islands or at off-shore locations.

In areas accessible by automobile, the North American Gravity Meter is conveniently mounted in a standard passenger car. With the tripod extended through the floor of the car, it is not necessary to remove the meter to make the reading.



Two 24-Cylinder, 2-Cycle Quad Diesel Units Drilled Oklahoma's Deepest Well

by Kenneth B. Barnes

DEEPEST producing well in Oklahoma, and a ranking discovery in the deep drilling play in the southern and western parts of the state is 1 Lawson, SW NW 22-5n-4w, near Lindsay. Owned by Cities Service Oil Co. (operator), Phillips Petroleum Co. and Mid-Continent Petroleum Corp., the well found good oil saturation in the first and second Wilcox sands. Loffland Brothers Co., the contractor, drilled the hole to a total depth of 10,997 ft. before 5½-in. o.d. casing was run and cemented with 1,000 sacks at 10,992 ft., and gun perforated at 10,973-10,990 ft. Among the preliminary production tests were flows of 648 and 901 bbl. of oil per 12 hours through a ½-in. bottom-hole choke on 2-in. tubing.

Power plant used on the rig may be said to typify the growing movement in various deep-drilling areas for an increased horsepower supply for hoisting and mud-pumping services. More and more horsepower for these uses is recognized as one of the major solutions in deep drilling for the obtainment of lower overall cost per foot, and a way to reduce the final investment in deep-well completions. While the 48-cylinder, 1,200-hp. power plant used in 1 Lawson, and pictured in Fig. 1, represents the product of only one of several prominent manufacturers of the larger sizes of drilling engines, it well represents the advantage of more power at reasonable engine weights. A closeup view of one of the two Quads employed on 1 Lawson is given in Fig. 2, and a similar power arrangement on an Olson Drilling Co. rig is shown in Fig. 3.

The Quad is one of the diesel models of the Detroit diesel engine division of General Motors Corp., newly introduced to the oil fields.

Design feature of particular interest for the Series 71 products of Detroit Diesel is the manner in which the basic 4¼ by 5-in., two-cycle, six-cylinder engine of 150 maximum horsepower can be aligned in either single, twin or quadruple units.

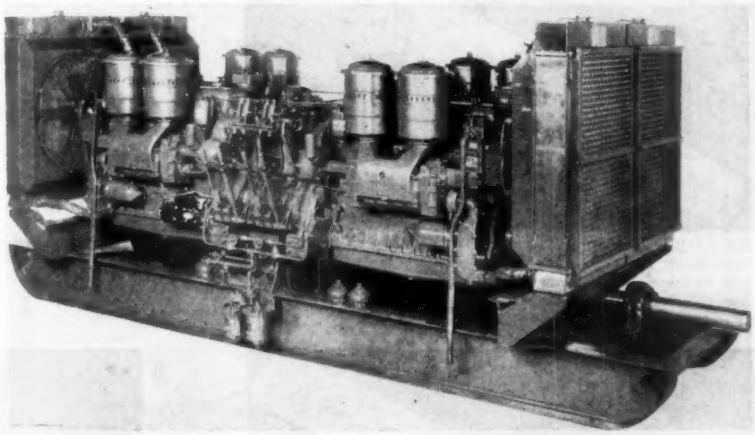


Fig. 1—(Below) Power plant which recently drilled 1 Lawson, Oklahoma's deepest producer, TD 10,995 ft. Both the first and second Wilcox sands were found productive, to secure a bull's-eye hit in one of the deep plays in the south and west sectors of the state

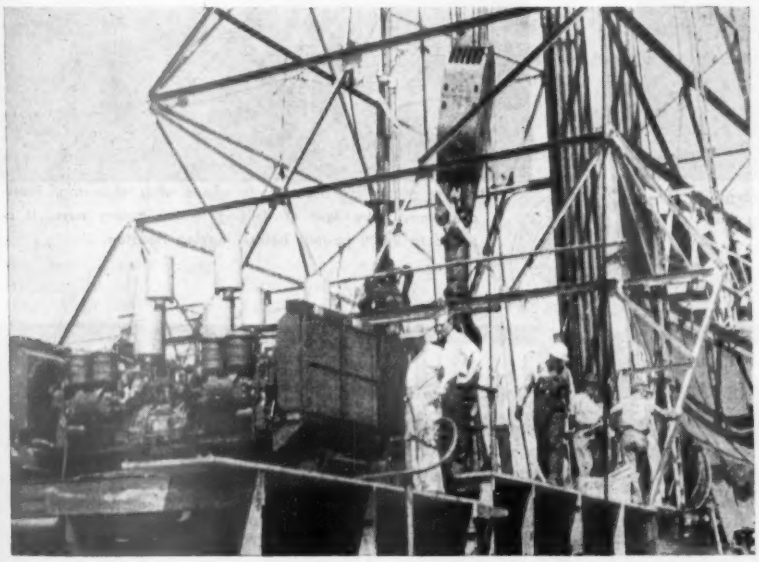


Fig. 2—(Right) Four basic 4¼ by 5-in., two-cycle, six-cylinder diesels are mounted in pairs, back-to-back, in the Quad design. This gives a single shaft maximum delivery of 600 hp. at total weight of 12,440 lb., or only 20 lb. per horsepower. Each engine has individual throttle controls and clutch

Individual Control

In the Quad model, four basic engines are mounted back to back on one skid assembly. The unit has its individual control panel, and each engine has independent throttle and clutch. In the twin unit two basic six-cylinder engines are used, driving through a clutch into a gear box, with final power delivered to one output shaft.

In the case of the Quad either one, two, three, or four engines may be operated, depending upon power requirements. Operation of fewer engines on each unit gives maximum economy when reduced power is required.

Arrangement of these engines into

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The above rotary hose can be saved. The Goodall Repair Department will repair the broken places and reinstall the same Barney Coupling, as these couplings can be used over and over again. Then this hose, that under past conditions would have been thrown away, will be ready for many more feet of drilling.

Your rotary hose is comparable in value to a car, so don't throw it in the junk heap.

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Note how carefully the Barney Coupling is made an integral part of the drilling hose, preventing undue flexing and cutting at the juncture of coupling and hose.

Picture of drilling hose shown above after repairing. There are many more feet of drilling in this rotary hose. It is tested to 2,000 pounds before leaving Houston.

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a unit is such that the accessories are always located on the outside, which permits ready accessibility for adjustments and servicing.

Another case, showing the use of large horsepower power plants in deep drilling is shown in Fig. 4, where two Quad units are being used by Olson Drilling Co. on Carter Oil Co.'s 1 Hawkins in McClain County, Oklahoma.

The accompanying table contains condensed statistics on two wells drilled by twin models of this type, there being two of these units powering the rig.

TABLE 1

Oil company: Stanolind Oil & Gas Co.
Contractor: Lee Drilling Co., Tulsa.
Location:

	1 Bryant Link, Fullerton pool, Andrews County, Texas	State Lease "L" 1, Lea County, New Mexico
	1	2
Total depth, ft.	7,187	5,519
Total hours on each engine	1,861	1,298
Total fuel used, gal.	18,973	14,915
Total lube oil used, gal.	161	130
No. rock bits used	54	29

1. Casing schedule: 13⅜-in.—250 ft.; 8⅝-in.—4,000 ft.; 5½-in.—6,830 ft. 2. Dry hole.

Daily Reports of Operation

Following the drilling of 1 Lawson, the two Quad units mentioned were moved to Phillips Petroleum Co.'s 4 Lea Mex location, 22 miles west of Lovington, N. M. The diesels were put on this well when it had reached a depth of 13,675 ft. Following are typical daily reports of the operation:

August 11.—After bottom of hole was reached, drilling was resumed for 4 hours at 800 shaft r.p.m., cooling water out at 160° F., 40 psi. lube-oil pressure. Engines were at one-fourth throttle; had 1,200-psi. mud pump pressure at 47 s.p.m.; rotary table at 60 r.p.m. 13,693 ft. had been drilled in shale and lime.

August 12.—Continued drilling for 10 hours under preceding conditions, at 13,708 ft. depth. Started out of hole to replace bit No. 242. First stands (approximately 90 ft.) came out at average of 62 seconds per stand.

August 13.—Completed trip and resumed drilling as before. Power supply was alternated from one unit to the other at 6-hour intervals as it was found quite sufficient to run only one of the units while drilling. Depth, 13,730 ft.

August 14.—Drilled 11 hours at 800 shaft r.p.m.; cooling-water temperature out at 160° F.; 40 psi. lube-oil pressure; two-thirds throttle; exhaust clear. Pump pressure 1,200 psi. at 47 strokes; rotary table at 60 r.p.m. Made trip at 13,740 ft. to replace bit No. 243. 13,750 ft. at end of day.

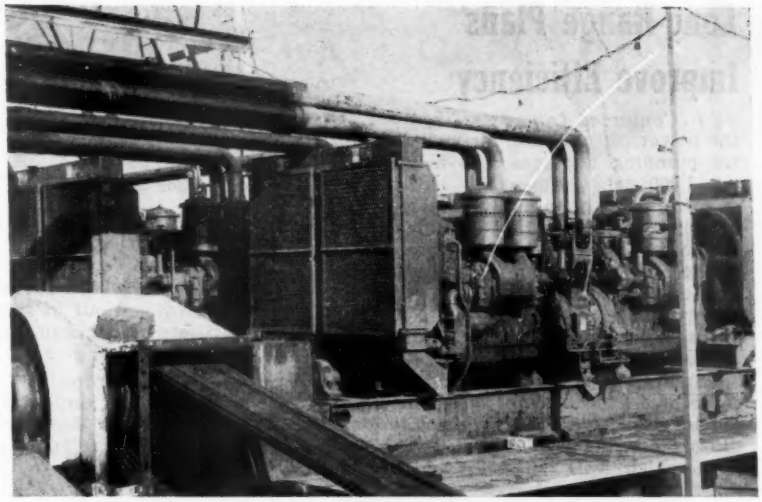

Fig. 3—The 48-cylinder, 1,200-hp. power plant of Olson Drilling Co. used on the 1 Hawkins in the area near the Washington pool of McClain County, Oklahoma. This pool, at about 10,500 ft., is Oklahoma's second deepest producing territory

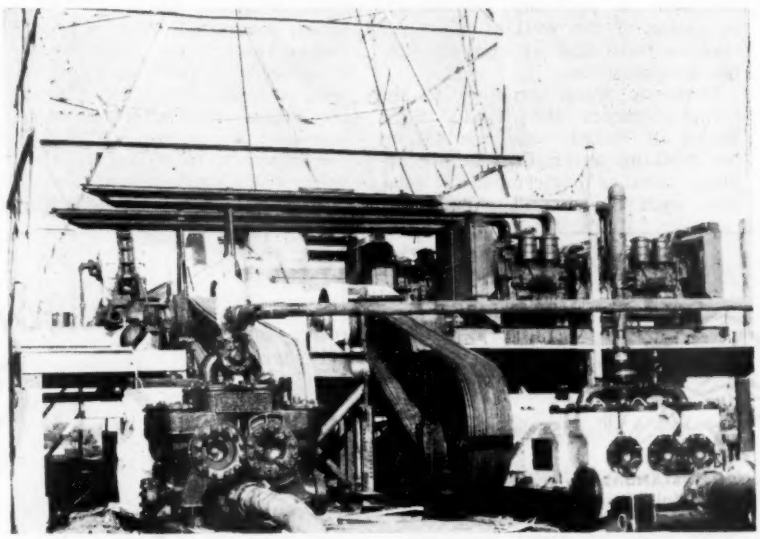

Fig. 4—Pump-side view of the rig at 1 Hawkins. A big duplex and a triplex give the large volumes and pressures necessary for deep drilling

August 15.—Drilled 23½ hours. Quads used alternately every 8 hours. Exhaust clear. Depth 13,788 ft.

August 16.—Trip made at 13,792 ft. to replace bit No. 244. Complete trip took only 8¼ hours, and more than 150 stands of drill pipe were brought up and sent down.

General Motors uses, in the two-cycle diesel design, a "uniflow" scavenging of the exhaust gases by means of a Roots-type blower which forms an integral part of each engine unit. This equipment is seen in Fig. 2 directly under each pair of air filters. At the bottom of each power stroke a change of air is forced into each cylinder to sweep out all burnt gases through the two exhaust valves located in the cylinder head. At the beginning of the compression stroke, therefore, each cylinder is filled with fresh, clean air.

Unit-type injectors are used, and these both meter and inject the fuel at the proper time in the cycle. No separate fuel-injection pump is required, and all high-pressure injection lines are eliminated. Oil cooling of the pistons form part of the high-pressure lubrication system, and individual radiators, fans, water pumps, built-in oil coolers and the separate electric starters and instrument panels complete the flexibility already mentioned, of multiple engine assemblies on a single skid to give power delivery at one point.

XUM

Long-Range Plans Improve Efficiency

(Continued from page 77)

the power consumption for well water pumping averages 1.58 kw.-hr. per 1,000 gal.

A breakdown on individual well performance shows that the oldest in the group produces 15.9 per cent of the total extraction, which figure well exceeds that of any other well in service at the refinery. The average service factor for this highest producing well reached a peak of 97.2 per cent in mid-1944 and because of a shutdown for emergency repairs dropped to 82.6 per cent for the balance of the 1944 period. The well, which was 21.1 years old at the time of the latest test report on its performance, is of the straight wall type and is equipped with a shutter screen. When started up at full flow the well delivers water essentially free of sand, which performance is probably due to the operation of the well at near continuous flow and at constant discharge pressures.

Domestic water supplied to the refinery meets the Texas State Board of Health recommendations for drinking water. Further precautions, such as bacteriological analyses each month and chlorinating of all lines which have been opened for repairs, are carried out in safeguarding the users of domestic water.

Peak demand on river water for the refinery ran to 26 per cent above the yearly average during the month of July. Maximum refinery requirements for domestic water reached 130 per cent of normal during the month of February. Well water for industrial uses, based on yearly averages, nearly equaled that of river water with the peak month falling in February. However, the peak was but slightly above the yearly average. Because a near constant volume of well water is pumped into the industrial water system, the differences between maximum and minimum figures over a yearly period are slight and consequently variations in the refinery's industrial water requirements are reflected in deliveries of river water to the plant. Analysis of well, river and mixed well-river water is shown in Table 2.

Due to the variation in chemical analysis of the well-river water mixture the treating plant equipment has been arranged so that treatment for any mixture of well or river water may be quickly carried out by the operators. Treatment for river-well industrial water requires acid, lime, and phosphate whereas straight river water is treated with lime, soda ash, and phosphate. An improvement over ordinary methods for lime slurry feed control is installed at one of the treating plants and plans are under way to equip a second treating unit with a similar control. The apparatus consists of flow control instrument which has its manometer connected into orifice nozzle taps in the raw feed water line to the settling tank and its connection for

TABLE 2—WATER ANALYSIS

	Mineral analysis, p.p.m.		
	Composite well water	Average river water	Average mixture well-river
Sodium	210	44	127
Calcium	10	40	25
Magnesium	2	3	2.5
Bicarbonate*	330	96	220
Chlorides	91	80	85
Sulfate	17	8	12
Total dissolved solids	538	275	457
Hardness*	29	104	66
Dissolved silica	27	19	23

*As calcium carbonate.

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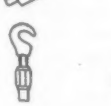

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Not only that! Conoco HD oil is carefully solvent-refined from selected paraffin-base stock, and is further fortified with still other special ingredients. One is an anti-oxidant —the other inhibits corrosion of engine parts. These special characteristics of Conoco HD oil can bring your engines a new degree of freedom from lubrication troubles—greater economy in operation and maintenance. Quick! . . . call the nearest office of Continental Oil Company.

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normally controlling an air-operated valve connected to the reset of a reset-rate-of-flow instrument is connected to ratio the rate of flow through a nozzle-type orifice in the discharge of the slurry pump. In order to keep the lines from the orifice in the slurry discharge line to the instrument from clogging with lime slurry, a continuous purging system using condensate for purging is connected into a manifold in the manometer lines near the instrument. Small orifices in the purge lines provide close regulation of condensate flow. Repeated tests show that the ratio controller maintains an accuracy of 10 p.p.m. of lime slurry in a total raw water flow of 2,000 g.p.m. Experience with the present method of controlling slurry feed shows that centrifugal pumps require less maintenance than is required by reciprocating pumps in the same service.

Prior to mixing surface water with well water, low pressure boiler feed water was not treated but because of the wide variation in the makeup river water all industrial water going to boiler feed is treated. Boiler feed makeup from the industrial water system goes to a clear well where it is acid-treated and aerated and then charged into a storage tank where sodium metaphosphate is injected. Feed water for 150 psi. processing steam gives a condensate with a minimum pH of 6.8.

Condensate from the various processing units is returned to an open tank where separation, of oil and other processed materials which may be in the condensate, is carried out. This step in recovering condensate serves as a safety measure in removing the volatile and other undesirable materials from the condensate which after passing through the separator vessel enters the boiler feed water pump suction along with the treated water. Evaporation losses at the separator vessel are normal for the conditions of the returning condensate and atmosphere. The recovered condensate from refinery processing units runs well over 25 per cent of the total water processed through the refinery's treating plants.

As a time-saving measure, acid cleaning of boiler tubes, machinery water jackets, feed-water heaters, and other tubular equipment is employed in the plant. A study of accurate records on tube cleaning operations shows that the acid method of cleaning comes to about the same cost as that of turbine cleaning but the over-all saving in time favors the acid method by nearly 12 to 1. Feed-water heaters in this plant are cleaned at an average interval of 6 months, by the acid method. Shutdown time for mechanical cleaning averages 168 hours for each feed-water heater, whereas acid cleaning of these units averages 20 hours and gives a more thorough job, for about half of the cost of mechanical methods. An additional advantage of acid over mechanical methods is that several heaters are cleaned at one time.

Cleaning of the cooling surfaces of jacketed machinery, such as fan and pump water-jacketed bearings, compressors and intercoolers, is carried out by recirculation of a weak solution of inhibited muriatic acid. Typical of the savings in pumping costs of jacket cooling water at the plant is that illustrated in the tests made on a compressor which supplies air for instrument operation at one of the refinery boiler houses. Before the practice of recirculating acid for cleaning the cooling surfaces of jacketed equipment, the temperature of the discharged air, from the above referred to compressor, was recorded at 240° F. which after recirculated acid cleaning dropped to 160° F.

Because of restrictions, production figures on the operation of the steam and power plants described here are omitted but such, where possible, are expressed in percentage values in order to indicate the relationship of the several important phases of steam and power plant operations as carried out at Humble's Baytown unit.

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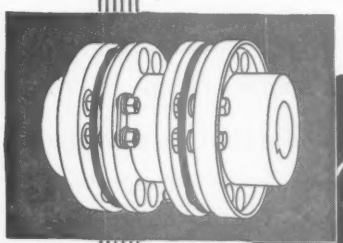

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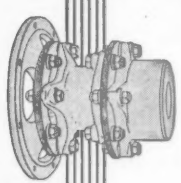

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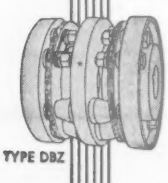

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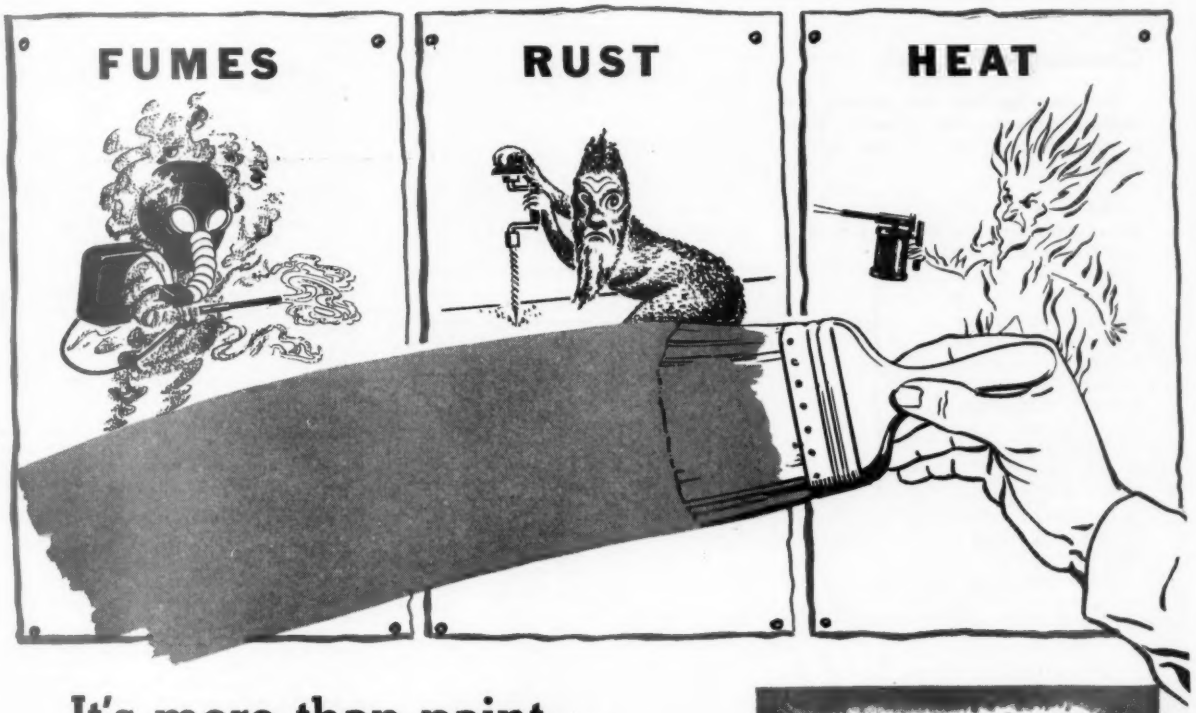

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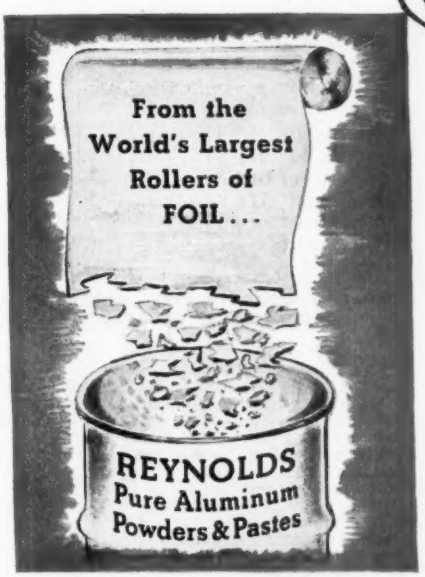

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Conductivity of Soil

We are figuring on putting gas cooling coils in the ground. What is the conductivity of the soil?—A. G. F.

The idea of using the ground for cooling coils is not a very practical one because the rate of heat transfer is extremely small, probably under 0.4 B.t.u. per sq. ft. of pipe surface per degree of temperature difference. Nevertheless, the conductivity of soil is valuable in the design of buried butane tanks, cross-country oil pipe lines, engine exhaust lines, etc., and hence the conductivities of soils and related materials are given here. One of the best references on this subject is the paper by C. N. Johnston, entitled, "Heat Conductivity of Soil Governs Heat Losses from Heated Oil Lines." Data from this paper and other sources are given in Table 1. Thermal conductivity is defined as the B.t.u. per hour conducted per square foot of cross-sectional area per degree of temperature difference (°F.) and for a thickness of 1 ft.

Soil is seldom dry except in the summer and hence the practical values are those for wet or damp soil. According to Johnston, the conductivity of wet soils (as much moisture as the flooded land will hold) is not related in any way to the density of the soil. Among dry soils or materials the thermal conductivity is higher for the more dense materials as indicated in Fig. 1.

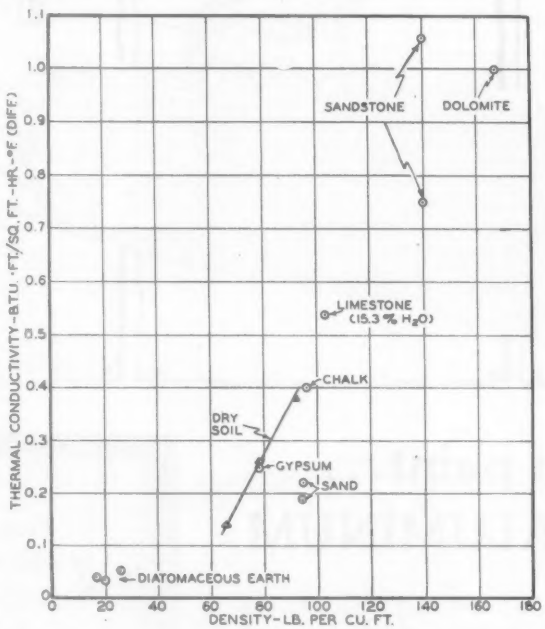

Fig. 1—Thermal conductivity as a function of density for somewhat dry materials

Other materials which are somewhat related to soil, or might occasionally be encountered, are shown in Table 2.

TABLE 1—CONDUCTIVITY OF SOIL AND CLOSELY RELATED MATERIALS

Material	Thermal conductivity	Density (lb. per cu. ft.)	Reference
Soil, dry	0.14	65.7	1
Soil, dry	0.26	78.0	1
Soil, dry	0.38	96.0	1
Soil, dry	0.8	...	2
Soil, very dry and light	0.208	...	3
Soil, damp clay or sand	0.915	...	3
Soil, wet subsoil	1.33	...	3
Sail, wet, maximum	2.62	...	1
Soil, wet, average	1.69	...	1
Soil, wet, minimum	0.85	...	1
Earth's crust	0.97	...	2 & 3
Sand, dry	0.224	...	2 & 3
Sand, dry	0.19	...	4
Ashes, wood	0.041	...	4
Clinker	0.27	...	4
Diatomaceous earth powder, coarse	0.036	20.0	4
Diatomaceous earth powder, fine	0.04	17.2	4
Diatomaceous earth	0.0314	...	2
Infusorial earth	0.82-0.97	...	2

TABLE 2—CONDUCTIVITY OF STONE AND RELATED MATERIALS

Material	Thermal conductivity	Density (lb. per cu. ft.)	Reference
Sandstone	1.33	...	2 & 3
Sandstone	1.06	140	4
Sandstone, dry	0.75	...	3
Sandstone, damp	0.975	...	3
Slate	1.14	...	2
Slate	0.86	...	4
Slate, perpendicular to cleavage	0.821	...	3
Slate, parallel to cleavage	1.45	...	3
Granite	1.28	...	3
Granite	1.0-2.3	...	4
Granite	1.09-1.21	...	2
Gypsum, dry and molded	0.25	78	4
Lava	0.49	...	4
Pumice stone	0.14	...	4
Lime	0.07	...	2 & 3
Chalk	0.484	...	2
Chalk	0.4	96	4
Marble	1.71	...	2 & 4
Marble	1.2-1.7	...	4
Limestone (15.3 vol. % H_2O)	0.54	103	4
Dolomite	1.0	167	4
Calcium carbonate, natural	1.3	162	4

Finally, Karge (Reference 5) suggests the following tabulation of heat losses in oil pipe lines.

K-B.t.u. Per Sq. Ft. Per Hr. Per Degree Difference in Temperature of Oil and Temperature of Air for Thickness of Soil Cover Indicated

Soil condition—	
Sandy soil, dry, 24-in. cover	0.25 to 0.40
Sandy soil, moist, 24-in. cover	0.50 to 0.80
Sandy soil, soaked, 24-in. cover	1.1 to 1.3
In river, 60-in. water, 60-in. cover	2.0 to 2.5
Sandy soil, dry, 8-in. cover	0.6 to 0.7
Sandy soil, moist to wet, 8-in. cover	1.2 to 2.4
Clay soil, dry, 24-in. cover	0.20 to 0.30
Clay soil, moist, 24-in. cover	0.40 to 0.50
Clay soil, moist to wet, 24-in. cover	0.60 to 0.90

References

1. Johnston, C. N., Heat Conductivity of Soil . . . Pet. Eng., Oct. 1937, p. 41.
2. Handbook of Chem. & Phys., 10th Ed., p. 519-521, Chem. Rubber Co., Cleveland, Ohio.
3. Kent's Mechanical Engineers Handbook, 10th Ed., p. 602 and 630, John Wiley & Sons, New York.
4. Perry, Chem. Eng. Handbook, 1st. Ed., p. 827-830, McGraw-Hill Book Co., New York.
5. Karge, Fritz, Design of Oil Pipe Lines, Pet. Eng., Apr. 1945, p. 184.

Mollier Diagram of Isobutane

We are looking for information on isobutane, preferably a Mollier diagram or a tabulation of temperature versus volume, enthalpy, and entropy, particularly in the critical region.—R. T. E.

Many data on the properties of hydrocarbons have been published and such data are in a continuous state of revision. An early reference on isobutane is Dana, Jenkins, Burdick & Timm in "Refrigeration Engineering," June 1926, Vol. 12, No. 12, page 403. This tabulation of temperature, pressure, specific volume, heat content, latent heat, and entropy has been published repeatedly in yearly issues of the Technical Manual of the Natural Gasoline Supply Men's Organization. More recently, a complete diagram was published by Sage & Lacey (Phase Equilibrium in Hydrocarbon Systems—Thermodynamic Properties of Isobutane), Ind. Eng. Chem., Vol. 30, page 673, June 1938. This diagram extends to temperatures of 280° F. and pressures of 3,000 psia.

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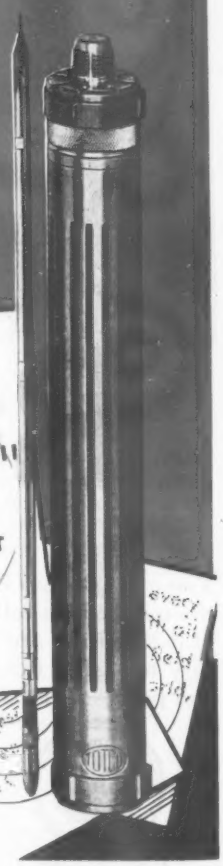

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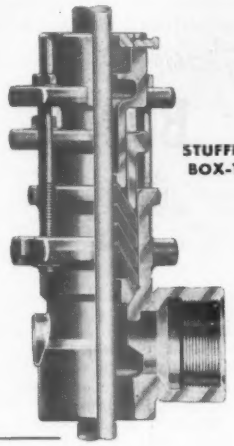

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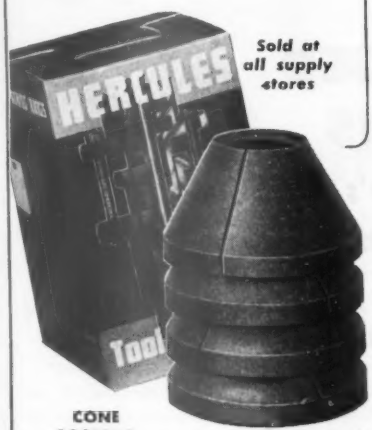

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carbons are rarely encountered, it would be wise to read the paper entitled, "Liquefaction and Regasification of Lighter Hydrocarbons" by Laverty & Edmister (The Oil and Gas Journal, September 4, 1941, page 35) which is being distributed by Clark Bros. Co., Inc., of Olean, N. Y. It does not contain data on isobutane (nearly all other light hydrocarbons) but it does emphasize the great difference in behavior of pure and slightly impure mixtures.

Change of Furol Viscosity With Temperature

We are now forced to use heavier fuel oils than usual and our specifications call for certain Saybolt Furol ratings at certain temperatures. Can you direct me to a curve sheet of Furol viscosity against temperature, similar to the one that I am enclosing which is for Universal viscosity?—A. G. S.

Saybolt Furol viscosities are almost exactly one-tenth of the Saybolt Universal viscosity for that same temperature. Therefore, the Saybolt viscosity chart that you are using can be used by dividing the values on the viscosity scale by 10. The Furol orifice was planned that way and the same is true of the Redwood Admiralty viscosity (for heavy fuels) used by the British as compared with the Redwood Standard Viscosity. Inasmuch as the Saybolt orifices are not accurate when used below 30-35 seconds, the range of temperature could only extend up to about 210° F. whereat the most viscous fuel oils (Bunker C) have a Furol viscosity of only about 30.

If more accuracy is required, the following equations of viscosity can be employed:

$$\text{Universal,} \quad \frac{z}{s} = 0.22\,T - \frac{135}{T}$$

$$\text{Furol,} \quad \frac{z}{s} = 2.16\,t - \frac{60}{t}$$

in which:

z = viscosity in centipoises
s = specific gravity at the same temperature
T = Saybolt Universal time, seconds
t = Saybolt Furol time, seconds

A simultaneous solution of these two equations results in a mathematical form that is very complicated, but they can be solved by plotting Universal versus Furol viscosity or by trial-and-error methods. Several relative values of Universal and Furol viscosity are:

Universal	Furol
300	31.25
1,000	102.2
5,000	510.0
10,000	1,020.0

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TELEMETERING—The Modern Control Tool

(Continued from page 98)

turned before the serviceman reached the station there then would be made a transfer to a remote manual setup by the local equipment, requiring the operator to put it back to automatic if he so desires.

Antioch Gas Terminal Meter Station

From Isleton meter station:

- A—Pressure telemeter receiver recording
- B-C—Pressure and flow telemeter receiver recording
- Remote valve control (pistol-grip switch)
- Selector switch for manual or automatic control
- Indicating lights to show selection

From master meter station:

- J-K—Pressure and flow telemeter receivers recording

From interchange meter station:

- E-F-I—Pressure and flow (two ranges) telemeter receivers recording flow one direction
- G-H-I—Pressure and flow reverse direction
- Remote valve control (pistol grip switch)

From the East Side pressure station:

- D—Pressure telemeter receiver

Receiver D and A are equipped with alarm contacts of the electronic type which do not absorb any power from the recording pen arm. Lights indicate any high or low pressure conditions at the remote point.

All these recording instruments and control devices are mounted on a steel panel 3 ft., 3 in. wide and 7½ ft. high. This panel is fitted as a continuation of the existing panelboard at the Antioch station.

From a description of the functioning of each device it can be seen that the operation of the field and a knowledge of conditions are continually at the fingertips of the plant operator.

We have many other stations on our system which perform, in a measure, similar operations. While the plant was designed for specific operations, it is quite apparent that the individual elements could be rearranged to fit almost any case. The installed cost of the telemetering and carrier current equipment is about $1,000 per function exclusive of any telephone line construction. When it is considered that this area represents a major source of gas and that its operating pressure is in the 800-lb. zone and, further, that rates of 20,000,000 cu. ft. per hour are sometimes handled, an investment as outlined can be reasonably justified.

BOOKS

"PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE," eighth edition, published by The Lincoln Electric Co., Cleveland, Ohio; 1,312 pages. $1.50.

The book, which includes details of the most recent welding methods and techniques, incorporates a wealth of new information that obsoletes much of the previous literature on welding.

Special effort has been made by the authors to provide complete information to help those in all fields of industry obtain the greatest possible benefits from the process of arc welding in the design and construction of various parts and products and in the use of the process as a maintenance tool.

In addition to standard data on welding symbols, speeds and costs, characteristics of metals, preheating, stress relieving, approach to welded design and other pertinent information, the newly revised handbook includes 16 new subjects such as: New cost tables; new welding techniques; mathematical calculations for new weld-designed structures; latest steel specifications on S.A.E. and A.I.S.I., including National Emergency Steels, etc.; underwater cutting; shop ventilation; maintenance of welding equipment; methods of testing, and filler-metal specifications for arc welding electrodes.

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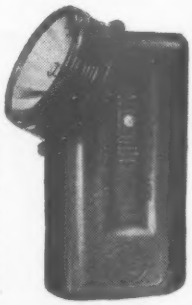

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ADAPTATION of the Orthophenanthrolines as color reagents to be employed in the rapid analysis of soaps, metals, and other operations formerly requiring extended time periods has been announced by University of Illinois. These reagents have been difficult in use in the past due to instability but have not been "stabilized" for practical uses.

Very small amounts of copper, cobalt chromium, zinc, iron, etc., may be detected by these reagents, when present in either organic or inorganic materials. One part of iron in a million parts of water is said to be detectable, forming red, water-soluble compounds between the iron and the anthroline. Industrial analyses formerly requiring several hours man now be made in 15 minutes, it is said.

Finding Material Defects By Sound Waves

RECENT announcement of a new method for finding cavities and other defects in rocket powder "grains" by supersonic means brings thoughts of the possibility of utilizing this principle to find cavities, cracks, holes, etc., in metallic equipment such as that used in the petroleum industry. According to our information Hercules Powder Co. has developed a process by which such irregularities in makeup of bodies of powder used to propel rockets may be discovered rapidly and cheaply by the use of supersonic sound waves.

The supersonic waves are generated by a crystal which is connected to a special electronic circuit, and are passed through the grain of powder which is not a grain in the sense we normally use the term, but is a chunk, cylinder, or mass of powder which may vary from 5 in. to 5 ft. in length. Any imperfection or irregularity in the body of the powder grain delects some of these waves. Deflection is picked up by a receiving crystal connected to a meter. The frequency of these waves is well above that of about 15,000 cycles, the highest frequency normally hearable by the human ear.

This process reduces greatly the number of operations which must be made in testing the rapidly growing production of this powder. Heretofore each grain was X-rayed, since imperfections are liable to cause serious difficulties with rockets and their handling. The amount of X-ray film is thus reduced 90 per cent below that required previously. This method requires only a part of the time formerly required and is more sensitive than the old method. At the rate rocket powder has been made recently not enough X-ray film is made in this country to meet the requirements of this one industry. Brush Development Co., Cleveland, has been making this apparatus for Hercules.

Super Fuel From Russian Turpentine

A COMPONENT of aviation gasoline twice as potent as isooctane is being made by Russian technologists from turpentine, the lowly, volatile portion of the sap of the pine and other trees. So says J. G. Tolpin, translator and editor for Universal Oil Products Co.'s Foreign Petroleum Literature surveys. This product is called "Uratol," and has been produced as early as 1943 in large-scale laboratory equipment at the Ural division of the Academy of Sciences, U. S. S. R.

The chemical composition, antiknock characteristics, and other properties of this miracle fuel are not disclosed by the translator, probably not by the inventor. One of the groups of hydrocarbons found in conventional turpentine from the pine tree is the terpene family, unsaturated ring complexes with very specific properties. Presumably this fuel is developed synthetically by changing the characteristics and the chemical structure of the terpenes. Russia has vast areas covered by coniferous forests, including pine, and without doubt the production of turpentine in emergency could be made relatively huge, especially if economic considerations be put aside. Turpentine itself offers some difficulties in use directly as internal-combustion-engine fuel as it gums seriously and requires larger carburetor jets because of its higher viscosity at operating temperatures.

Production of other synthetics from wood and other raw materials is reported from Russia. More than 100 commercial units for making lubricating oils from wood-tar fractions were under construction in 1943. A synthetic resin from pine lignin—binding material in wood—and acetylene, from petroleum, natural gas or other source, is under experimental development, it is claimed. Russia is searching for sources of important materials other than petroleum, in the event her petroleum supply runs low.

Atomic Bomb Patent Rights Become Federal Property

ALL right to the patents covering the developments leading to the atomic bomb have been transferred to the Government of the United States. The Kellex Corp., probably the most active of the organizations which developed this entire project, has assigned title to these patents and applications to the federal Government, assuring that they will not become the tools of private industry except by decision of the American people.

Application of the principles and developments in this the most stupendous product of World War 2 to peacetime industrial uses is expected to result in huge and far-reaching advantages, according to the scientists and executives closely associated with the matter. Just what those developments will be has not been made public, and are likely in the nebulous stage at present.

One of the major materials used in the bomb is U-235, an isotope of uranium, heaviest of discovered elements and one which is highly radioactive. Three plants at the Oak Ridge, Tenn., project site worked out the manner of recovery of this all-important isotope. For the benefit of those unacquainted with the term "isotope" it means, broadly, a molecular form of an element which varies from the standard or average form only in the possession of a few more or a few less electrons than does the average molecule of the element. These three plants concentrated the material by (a) thermal diffusion, (b) magnetic separation, and (c) diffusion separation through a porous barrier. The last named unit was designed by the Kellex Corp., subsidiary of the M. W. Kellogg Co. Many other companies as well contributed engineers, time, labor, and know-how to the development of this atomic bomb. Details of the project will not be made public, in all probability.

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Since 1941, America has raced against Time—and won. During all the months of war, the General American Tank Car Fleet has been in action . . . transporting a hundred different vital liquids safely, surely—and economically.

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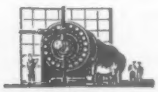
Process Equipment of All Kinds

Pressure Vessels and Other Welded Equipment

Aerocoach Motor Coaches

Precooling Service for Fruits and Vegetables

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Tower Hydraulics

IN analyzing the flow of liquids or froth across a bubble tray and particularly in the lines leading from the tower to the steam strippers or to cooler coils, the physical properties of the fluids handled is important. Accordingly, in Table 1 is tabulated the average gravities of the liquids handled in the towers. It will be noted that they are about the same for all materials because the liquids are at or near their boiling points and hence the average values given in Table 2 are satisfactory for most practical computations. The tower temperatures used for Table 1 were taken from The Refiner's Notebook No. 48 of June 30, 1945.

The extremes of Table 1 are caused by differences in tower pressure, amounts of steam, and the base of the crude oil. Thus low pressure, much steam, and a naphthenic stock give high values of specific gravity and vice versa. More normal conditions and constants are given in Table 2.

In delivering liquid from the tower and to storage it is customary to utilize only gravity flow except for the bottom liquid which is usually pumped. Fig. 1 shows the heads or elevations required to cause satisfactory flow. Unfortunately, methods of computing pressure drops or friction losses through lines or coils have not yet been presented in The Refiner's Notebook and hence only part of the situation can be illustrated. The lowest stripper must be high enough from the ground to deliver its product through the cooler up to the storage tank inlet. This in turn necessitates that the main tower be raised sufficiently by a frame or skirt to cause liquid to drain into the stripper. These two requirements give rise to the following rules (see Fig. 1):

1. Steam vent must be large enough to cause substantially no back pressure on the stripper. (See Notebook No. 18, November 18, 1944.) **Elevation difference C** must overcome back pressure in stripper.

2. Elevation difference A must be enough to overcome the friction loss through the seal line and its valve.

3. Elevation difference B must be enough to overcome friction in rundown lines and cooling coil.

4. Minimum elevation D consists of elevation B plus the height of the discharge line or highest liquid level in the product storage tank (whichever is the greatest) less a correction for the difference in pressure in the tower end in the storage tank.

5. Minimum elevation E which may require raising of the main tower, consists of elevation D plus elevation A plus the length of the stripper.

TENTATIVE SCHEDULE

The general theory of topping plant towers was described in eight issues (April 28-August 18). The following are issues pertaining to the mechanical details of bubble towers:

No. 49, July 7—Weight of Towers
No. 52, July 28—Downcomers
No. 53, August 4—Foundations
No. 54, August 11—Bubble Caps
No. 59, September 15, Tower Hydraulics

Topics on tower operation and on fractionation are:

No. 55—Side Reflux
No. 56—Regulation of Initial Boiling Point and End Point
No. 57—Dirty Streams
No. 58—Kerosene Stripping
No. 59—Tower Hydraulics
No. 60—Bringing on Stream
No. 61—Gasoline Performance

TABLE 1—SPECIFIC GRAVITY AND VISCOSITY OF LIQUIDS IN TOPPING TOWERS

50% B.P. of liquid	A.P.I. gravity at 60° F.	Specific gravity: Extreme range	Specific gravity: Naphtha base oils	Specific gravity: Mixed base oils	Specific gravity: Paraffin base oils	Viscosity centipoises
200° F.	57-66	0.61-0.72	0.69	0.68	0.66	0.21
300° F.	47-57	0.62-0.73	0.7	0.67	0.65	0.25
400° F.	36-47	0.61-0.76	0.73	0.67	0.65	0.29
500° F.	26-42	0.61-0.81	0.78	0.68	0.65	0.33
600° F.	22-37	0.62-0.82	0.79	0.70	0.66	0.39
700° F.	17-31	0.63-0.83	0.80	0.71	0.68	0.47

TABLE 2—AVERAGE PROPERTIES AND HYDRAULIC CONSTANTS FOR LIQUIDS IN TOPPING TOWERS

	Naphtha base	Mixed base	Paraffin base	Average
Specific gravity	0.74	0.68	0.66	0.685
Lb. per gal.	6.13	5.66	5.49	5.7
Lb. per cu. ft.	46.2	42.4	41.2	42.7
Ft. head/psi.	3.2	3.4	3.5	3.4
Psi./ft. head	0.321	0.294	0.286	0.296

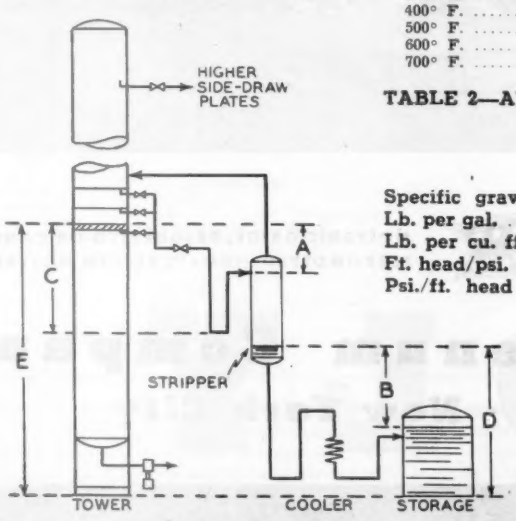

Fig. 1 — Elevations of tower and stripper to cause satisfactory gravity flow

No. 59 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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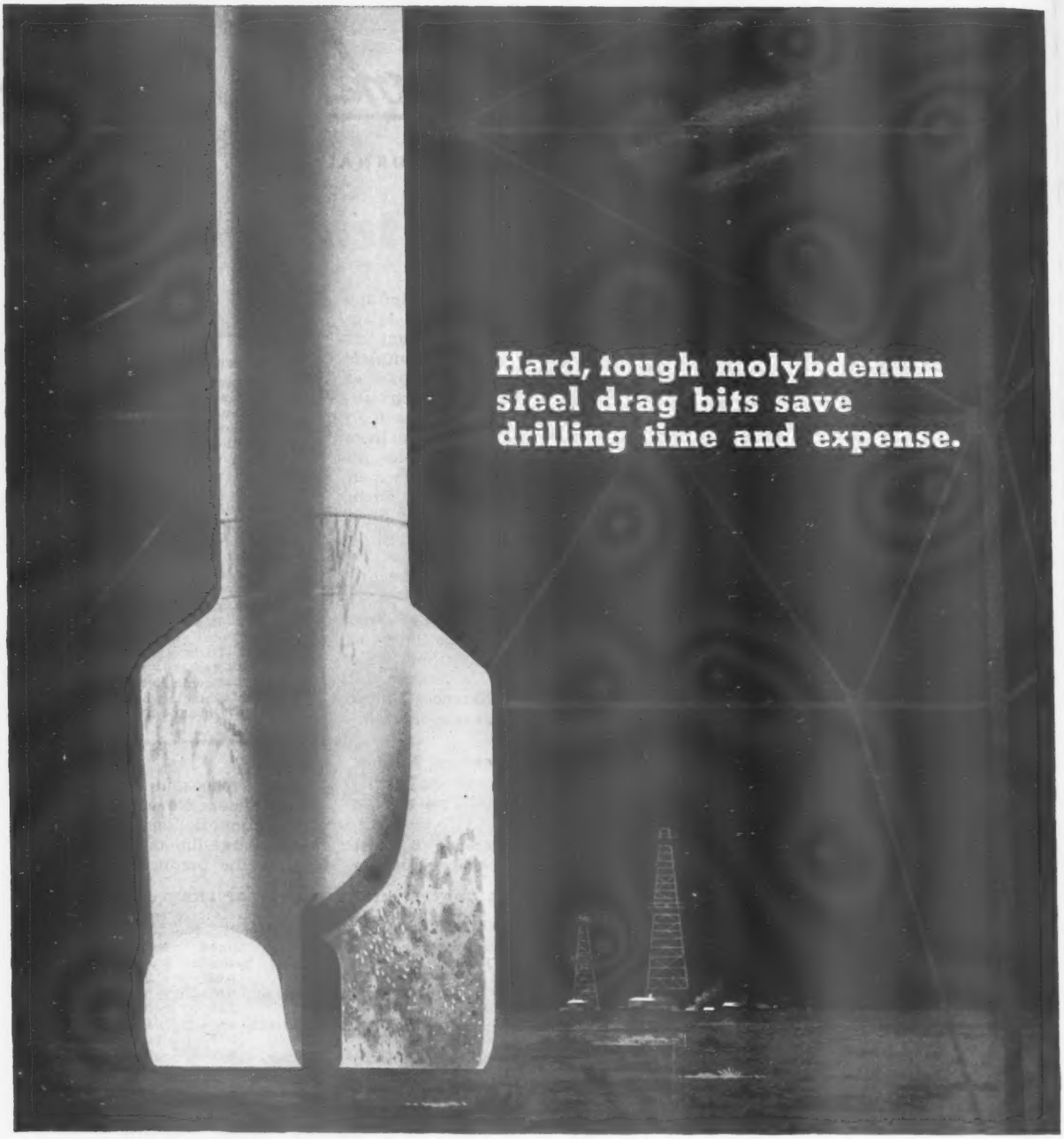

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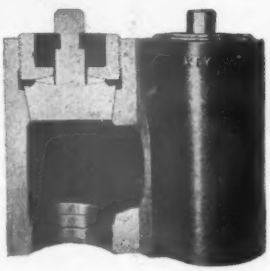
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

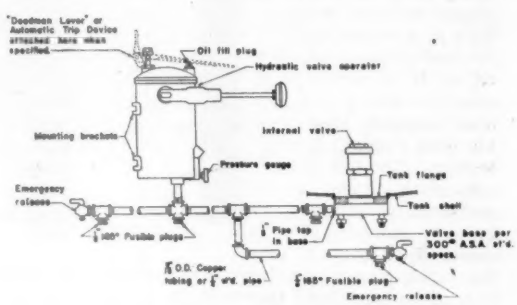
by Kenneth B. Barnes

(1) KEY 7000 RETURN BEND is improved design, developed after thorough investigation of installation and maintenance problems on tube coils by Key engineers, superintendents, and foremen in petroleum - refining industry. From stress-strain research program at University of Michigan, has been found to incorporate strongest type closure mechanism. Requires less wrench load for tightening. Results in minimum of installation stresses, easier heading and unheading. Plug-pulling mechanism is positive and simple. In accordance with A.P.I., A.S.M.E., A.S.A. standards and codes. Assembles on minimum centers. Reinforced streamline crossover port minimizes pressure drop and turbulence. *Key Co.*



IT'S NEW CHECK IT

(2) INTERNAL EMERGENCY VALVE SYSTEM for liquefied petroleum gases offers special safety features for truck tanks and trailers carrying any LPG product. A valve is mounted on discharge opening of tank, but is entirely inside. Valve is normally closed by a spring and opens only when hydraulic pressure is applied. Since valve is held open during discharge operation by hydraulic pressure, the melting of a fusible plug will immediately close the valve and shut off flow. Tubing in which plugs are placed may be run entirely around tank to provide fire protection at desired points. System protects LPG truck tanks and trailers against: (1) Loss of load and resultant damage in case of fire while making a delivery; (2) loss of load and resultant damage if discharge pipe lines or valves are knocked off or broken by accident on road. *Shand & Jurs Co.*



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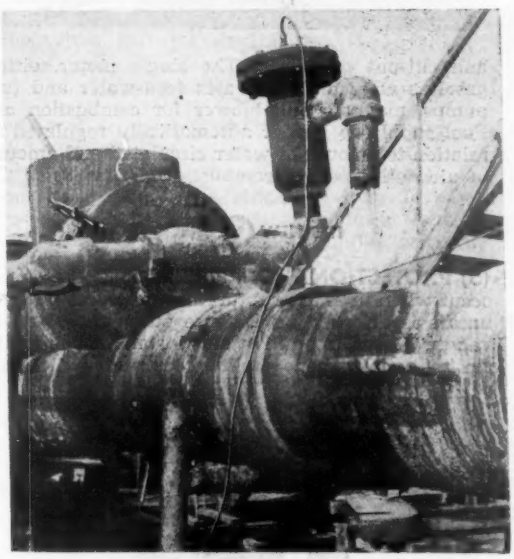

(3) AUTOMATIC WATER-MUD CONTROL valve assures better regulation of mud weight and viscosity. Size 8 x 11 in., weighs 39 lb. Actuated by the slush pump, the valve allows water to flow into the mud stream at a preset rate only as long as the pump is running. When pump is shut down, the valve automatically stops the water flow to the mud stream. Uses spring-loaded neoprene diaphragm; all working parts exposed to water are of non-corrosive materials. *Warren Automatic Tool Co.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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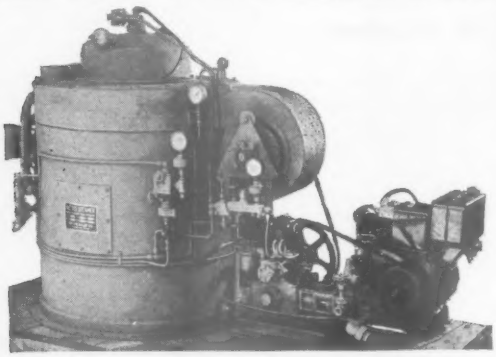
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

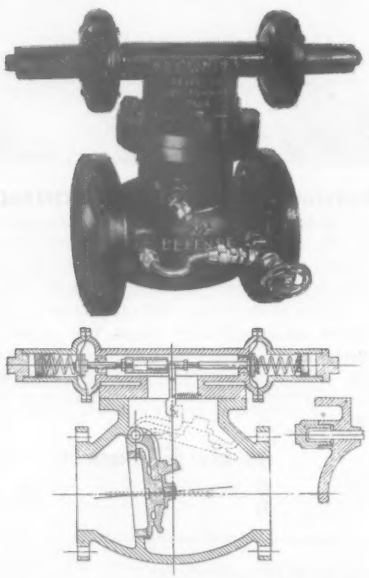
(4) 40-HP. PORTABLE STEAMER is designed especially for oil-field service. Operates up to 600 psi. steam pressure. All-steel construction. Simplified controls give lower differential in cut-in



and cut-out pressures. The single motor, either gasoline or electric, operates feed-water and fuel pumps, magneto and blower for combustion air. Fuel supply to burner automatically regulated in relation to amount of water circulated and amount of air delivered for combustion. *Bettis Sales Co.*

IT'S NEW CHECK IT

(5) PROTECTION FROM FIRE LOSSES that may occur when lines are ruptured or pressures become unsafe is afforded by Defense automatic shut-off valves. Valve is positive and instantaneous in its closing action whenever line pressures rise or fall

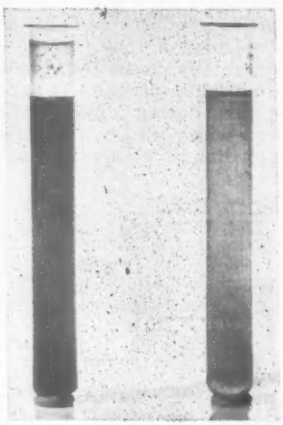


from preset operating pressures. Valves may be placed in reverse to each other, to illustrate one application, on either side of a danger area in a pipe line, and will close in case of a rupture, to save both flow and line pack. Valve in 1¼ to 8-in. sizes. *Security Valve Co.*

(6) PROCESS CONTROL SIGNAL provides safety alarm principles that operate automatically, also gives on-off control in addition to air control to actuate motorized and solenoid valves, contactor panels, signal lights, etc. Contacts (A) and (B) make or break by cam (C) and roller (D), and the spring loaded lever to which it is attached. Control point is set by loosening knurled knob (E) and rotating cam (C), so that its notch corresponds to position of the pen that has been previously moved to the desired point. *Brown Instrument Co.*

IT'S NEW CHECK IT

(7) INDUCO FLUID FOR DIESEL FUELS chemically converts any sludges, gums, and resins present into usable hydrocarbon elements. Use of Induco fluid is reported to lessen clogging of injectors and formation of hard carbon deposits. Control tests in a fleet of diesel trucks have been summarized "Found it eliminated all hard carbon, cleaned the jets, and stopped trouble with clogged injectors." The left illustration shows a sediment of sludge in one sample of diesel fuel oil; in the right, sludge has been eliminated after addition of Induco fluid to result in a clear, uniform oil. *Industrial Chemical Co.*

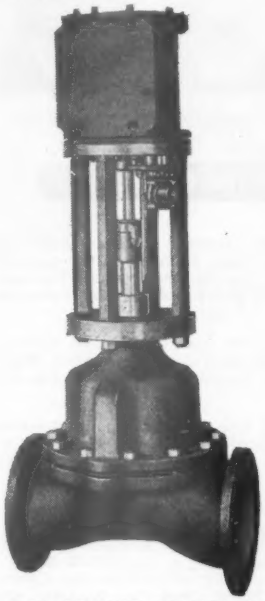


IT'S NEW CHECK IT

(8) INHIBITS SLIME AND ALGAE GROWTH controls and prevents formation of hard lime scale on coils and surfaces in evaporative condensers and coolers, in water cooling jacket systems for gas engines and diesels, etc. The new chemical development, Oakite Airefiner No. 52, is a white

powder, completely soluble, odorless, non-toxic. One ounce is added to 10 gal. of makeup water. Keeps equipment clean, minimizes need for maintenance, and raises cooling efficiency otherwise affected by water hardness and bacterial organisms. Nation-wide advisory service. *Oakite Products, Inc.*

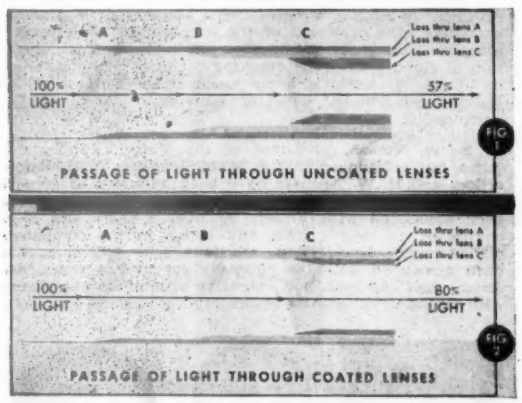
IT'S NEW CHECK IT



(9) REMOTE CONTROL PROBLEMS are answered simply, inexpensively and reliably by power transmission to air-operated valve. Westinghouse Air Brake Flexair-Controlair controls, together with the air actuated piston mounted on the valve, serve the operation, and supply either open and shut positions or smooth throttling. *Hills-McCanna Co.*

IT'S NEW CHECK IT

(10) COATED LENSES IN TRANSITS and levels represent new stride in surveying instruments. Brightness is increased and image contrast greatly improved. U. S. Army and Navy now require certain instruments to contain coated lenses. Thickness applied is 5½ one-millionths of inch, and variance is less than 1-millionth of an inch. Gives 40 per cent improvement in light transmission. Principle involved is that a glass surface exposed directly to the air reflects some of the light reaching the surface, and the new method improves on the "tarnishes" and natural fungus growth coatings previously used. *David White Co.*



IT'S NEW CHECK IT

(11) RUST REMOVER—FORMULA 314 readily dissolves rust of all types on iron and steel. Leaves a microscopically thin coating of chemical on metal to inhibit further oxidation, thus giving double function of rust remover and rust preventer. The inhibiting coat of Formula 314 makes an ideal base for paint jobs. *I.S.E. Co.*

TRADE LITERATURE

(12) RING GASKETS. Eight-page booklet gives complete information and buying data on forged gaskets made of ingot iron, nickel, chromium, and monel metals. Gaskets suitable particularly for high-temperature and high-pressure service. Various applications and advantages presented. Illustrated and contains tables giving A.P.I. and A.S.A. ring-gasket sizes, special stock sizes, and list prices. *Steel Improvement and Forge Co.*

IT'S NEW CHECK IT

(13) FILTERS. Eight-page booklet in two colors written to acquaint engineers of process plants with a line of filters. Lists types and gives distinctive features and general application of each. Illustrated. *Oliver United Filters, Inc.*

IT'S NEW CHECK IT

(14) THE HORTONSPHEROID. A new 10-page leaflet describes reduction of evaporation losses from volatile liquids by storing them under pressure. The reduction of filling, boiling, breathing losses are discussed. Gaging methods including theoretical gage tables, tank strappings, and water calibration are also described. *Chicago Bridge & Iron Co.*

IT'S NEW CHECK IT

(15) PRESSURE VESSELS. An attractive folder describing facilities and capacity to produce a large variety of pressure vessels for refineries, chemical plants, etc., together with all types of fabrication incident to construction and erection of such equipment. *The Darby Corp.*

IT'S NEW CHECK IT

(16) SAN FRANCISCO CHARTER. A handy, pocket-size booklet contains the Charter's complete text. Booklet lists nations which have ratified it with space to record approval by other nations. *Clark Equipment Co.*

IT'S NEW CHECK IT

(17) ENGINES. A very complete fabricoid-bound catalog describes a complete line of engines, illustrating each one, giving specifications. Contains installation photographs, several cutaway drawings, construction features, performance charts. *Hall-Scott Motor Car Co.*

IT'S NEW CHECK IT

(18) FRACTIONAL HORSEPOWER DRIVES. Late catalog contains specifications and prices on the complete new line of fractional horsepower sheaves and belts. Has four pages of condensed and simplified drive tables for a wide range of center distances and drive ratios. *The American Pulley Co.*

XUM

(19) TOOL STEELS. A pocket-size catalog and manual—170 pages—gives complete coverage of tool steels for all uses. Contains many technical data, is liberally illustrated. Thumb indexing and sectional arrangement with a general alphabetical index make it easy to use. *Allegheny Ludlum Steel Corp.*

IT'S NEW ✓ CHECK IT

(20) NEEDLE BEARINGS. A new 153-page manual combines the catalog feature with a wealth of engineering and application data. Profusely illustrated with cross-section drawings. Includes specifications, tolerances, load capacities, design factors, installation and inspection data, various standards. Fully indexed and contains many tables, formulas and illustrations to clarify technical data. *The Torrington Co.*

IT'S NEW ✓ CHECK IT

(21) ELECTRONICS IN AIR FILTRATION. A new booklet for semi and nontechnical consumption. Printed in three colors, booklet contains much artwork to aid in understanding of text matter. Explains theory and practice of electronics in air filtration in very readable manner. *American Air Filter Co., Inc.*

IT'S NEW ✓ CHECK IT

(22) PLATE FABRICATION EQUIPMENT. Eight-page folder in two colors pictures plate fabrication equipment used in the oil industry. Bulletin shows scope and range of oil industry work which can be done. Describes gas absorbers, fractionating towers, heat exchangers, lined vessels, separator towers, stills, treaters, filters, tanks, tank cars, etc. *General American Transportation Corp.*

IT'S NEW ✓ CHECK IT

(23) EARTH-MOVING AND LIFTING EQUIPMENT. A new catalog containing the latest information on high-speed earth-moving and lifting equipment. Profusely illustrated, it pictures and describes an entire line giving also distributor, shop and service facilities. Operational features of each tool fully described with specifications. Improvements analyzed in detail. *R. G. LeTourneau, Inc.*

IT'S NEW ✓ CHECK IT

(24) RECONVERSION INVENTORY. Three bulletins, one on V-belt drives, one on centrifugal pumps, and another on electric motors show in each case how to take inventory. Each printed in two colors and contains a check list as well as detailed instructions. *Allis-Chalmers Mfg. Co.*

IT'S NEW ✓ CHECK IT

L. E. FERGUSON *R. P. WALKER* *L. A. HARLOW*

MEN IN THE NEWS

Lawrence E. Ferguson recently became associated with Franks Manufacturing Corp. of Tulsa, in the capacity of assistant sales manager. For the past year he has been technical copy writer with the Brooks-Wilson Advertising Agency of Tulsa.

Rodpak Manufacturing Co. has announced appointment of **Ralph P. Walker** as general sales manager. Walker has been with General Petroleum Corp. for the last 12 years.

Lewis A. (Lew) Harlow was recently appointed manager of the advertising division of Fairbanks, Morse & Co. He joined Fairbanks-Morse in 1943 as assistant advertising manager.

R. J. "Bob" Eiche and **T. G. Martin** recently announced the opening of export offices in Suite 422 Petroleum Building, 714 West Olympic Boulevard, Los Angeles 15, Calif., where they will continue as heretofore to handle foreign sales for the following companies: The Cavins Co., Chiksan Co., Eason-Therolf Tool Co., Eastman Oil Well Survey Corp., Hamer Oil Tool Co., Hopper Machine Works, Inc., Pacific Perforating Co., Web Wilson Oil Tools, and Well Equipment Mfg. Co.

Eugene J. Houdry, inventor of catalytic cracking and president of Houdry Process Corp., and **Arthur V. Danner,** executive vice president of the corporation, with several associates, have arrived in Moscow to discuss the operation of Houdry catalytic cracking facilities being installed in Russia. The trip is being made at the request of the Russian Government with the sanction of the U. S. Department of State.

B. W. Vinson, president of the Vinson Supply Co., Tulsa, has announced that **J. M. McReynolds, J. H. Heinzerling,** and **H. W. Arduser** have been admitted as general partners of the company. McReynolds, sales manager, has been associated with Vinson for over 9 years and is in charge of all supply lines and active in the company's management. Heinzerling, assistant sales manager, has been associated with the company for over 4 years. Arduser, chief engineer, had extensive production experience with major oil companies before joining Vinson 8 years ago

J. M. McREYNOLDS *J. H. HEINZERLING* *H. W. ARDUSER*

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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Belt quality is determined by the method used in its manufacture. That's the reason why a reputation for dependability and long life has been built on the service to the oil industry rendered by Happy Belting. For all Happy Belts are made by the Rotocure Process of Continuous Vulcanization developed, perfected and used exclusively by the Boston Woven Hose and Rubber Company.

Happy Belts are cured without press over-laps or press marks — no over-cure or under-cure at any point. Continuous service to the Petroleum Industry for more than twenty-five years reflects the satisfaction given by this improved belting. The Happy Company Pioneered Endless Belts, along with Idler permitting their use. We also established lengths that were adopted by A.P.I. as standards.

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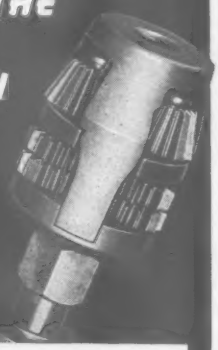

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It cleans fast and keeps going.
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IT'S NEW — THE HOLAN 2-TON WINCH

Front view of Holan 2-ton Winch

The Latest Development In Compact, Easily Operated Winches — Tops in Quality

Small and compact, this winch is exceptionally easy to operate and very efficient. Two speed ratios permit handling heavy loads at slow speeds and light loads at high speeds. Perfect control is assured for raising load. When lowering load, control is secured by a single shoe hand brake that has sufficient capacity to hold full load. Full rated load is 4000 lbs., but each winch is tested at factory by applying a load of approximately 6000 lbs.

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REFINING

Phillips Now at Capacity On Peacetime Products

BARTLESVILLE, Okla.—All Phillips Petroleum Co. plants formerly devoted to war output are now operating at capacity on peacetime products, according to Frank Phillips, board chairman, and K. S. Adams, president.

"The day government restrictions were lifted," they said, "our operations were shifted to making a new motor fuel, the best we have ever produced. The improved product is already in the tanks of many of our jobbers and dealers."

Reconversion has caused no layoffs of Phillips refinery personnel and jobs are awaiting all the 2,864 employes on military leave, 227 of whom have returned to company duty to date.

Discussing the company's plans, the management said: "Because our manufacturing facilities will continue in postwar use, the company is in position to supply expanding peacetime markets with gasoline and other products. There probably will be a temporary reduction in national requirements of petroleum products, but demand will expand rapidly as industry in general resumes full civilian production."

One of the first manufacturers of 100-octane aviation gasoline, Phillips expanded its manufacturing operations rapidly after Pearl Harbor, and company production of ingredients for making 100-octane aviation fuel reached a wartime peak exceeding 1,000,000 gal. a day.

More Than 400 Refineries Still Making 100-Octane

WASHINGTON.—More than 400 refineries still are making 100-octane gasoline, inquiry reveals. At the peak of wartime activity there were 500. Many natural-gasoline plants too are contributing to the output. Since Pearl Harbor more than 360,000,000 bbl. of this type of fuel has been manufactured. Stock piles are located at various points in the United States and at various bases outside this country, set up for both German and Japanese wars.

Although all domestic air transportation is on lower octanes, the 100-octane, besides being used by the Army and Navy, is now available to such over-water enterprises as Air Transport Command and commercial air lines.

Present stocks are said to be sufficient for the Army and Navy to continue curtailed operations indefinitely. The number of refineries that will continue to make 100-octane gasoline after Petroleum Administration for War gives up controls will depend upon the individual refineries and their relation to the military.

Future purchase of 100-octane and other petroleum supplies, heretofore cleared through Reconstruction Finance Corp., may be cleared by a joint Army-Navy committee on such purchases if present plans crystallize Prior to the war these services had their own procurement.

Government Returns Oil Refineries to Owners

WASHINGTON.—Return of three oil-refining properties seized by the Government to prevent labor disputes from hampering the war effort has been approved by William H. Davis, director of economic stabilization. The properties are those of The Texas Co., Port Arthur, Tex.: Pure Oil Co., Dawes, W. Va., and Humble Oil & Refining Co., Ingleside, Tex. They have been operated under the direction of Petroleum Administration for War.

Humble Obtains Lease on Government War Plant

HOUSTON.—Humble Oil & Refining Co. has obtained from the U. S. Government a lease on the Baytown Ordnance Works, adjoining Humble's Baytown refinery, for a period "not to exceed 60 days." Disposition of the unit will be determined meantime. No statement has been issued concerning the possibility of permanent operation of the plant through lease or purchase.

The Baytown ordnance works is a Defense Plant Corp. project, built at an estimated cost of $12,000,000. It was one of seven local DPC plants declared surplus property by the War Department August 23, and as such was made subject to immediate sale.

Until recent months the plant produced more than half of all the toluene for high explosives used by the United Nations. Completed in 1941,

it was the first to make toluene synthetically from petroleum and the first shipment of the finished product was made 47 days after Pearl Harbor. The plant was designed to produce toluene at the rate of 30,000,000 gal. yearly; but by September 1942 the production rate was more than double that. After October 1942 this plant was producing at the rate of approximately 70,000,000 gal. annually, more than twice as much as could be made under the old process.

Humble will use the facilities of Baytown Ordnance Works in the manufacture of commercial solvents.

Gasoline Reimbursement to Terminate September 30

WASHINGTON.—The aviation-gasoline reimbursement plan will terminate September 30, according to Petroleum Administration for War announcement. The plan, part of the war program, protected refineries engaged in the manufacture of aviation gasoline and its component parts against financial loss in the event of changes of specifications or extraordinary operations requested or approved by PAW.

Contracts for aviation gasoline already have been terminated. The new action sets a deadline on claims for reimbursement for financial loss incurred through participation in the aviation-gasoline program, but does not prejudice claims after that date for operations prior thereto.

Continental Leases DPC 100-Octane Plant

PONCA CITY, Okla.—Continental Oil Co. has reached an agreement with the defense plant division of the Reconstruction Finance Corp., owners for the Government, providing for a 90-day lease of the 100-octane aviation gasoline plant here for the manufacture of high-test motor gasoline pending negotiations looking to a long-term lease or purchase of the plant, officials announced last week.

The 100-octane plant, built by the DPC at a cost of approximately $17,000,000 and leased to Continental Oil Co., was put in operation in May 1944. Continental has produced and delivered to the Government a total of 108,000,000 gal. of 100-octane aviation gasoline in the completion of its contract with the Government for this fighting aviation fuel.

The new agreement hereby announced permits Continental to continue operations without interruption until final negotiations are completed.

"By utilizing the 100-octane plant, Continental will manufacture a new motor gasoline which will not only be an improvement over wartime gasoline but will be on a substantially higher test than was made before the war," stated Dr. Walter Miller, vice president in charge of manufacturing. The plant here was the first completed in this area and from it came the first barrel of 100-octane aviation gasoline ever to be completely processed in a single plant in Oklahoma.

Tide Water Shifts to Peace Basis Without Layoffs

BAYONNE, N. J.—Tide Water Associated Oil Co.'s Houdry and Thermofor catalytic-cracking plants here, built for manufacture of wartime aviation gasoline, have been converted to production of civilian-grade motor fuel without laying off any workers, according to B. I. Graves, vice president.

"Rapid conversion of our huge catalytic-cracking units has released motor fuel of high quality which will help to eliminate danger of shortages for those who travel in automobiles," Graves said.

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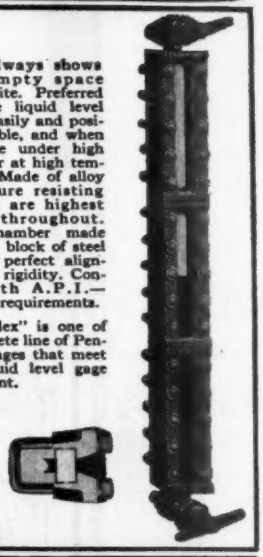

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Winter freeze-ups are eliminated by moving the point-of-pressure-reduction from the surface to the regulator at the bottom of the hole. Thus, by using natural formation heat to absorb temperature losses due to gas expansion, your tubing acts as a "mile long heater"—the most efficient heater known.

The New Type C Removable Bottom Hole Regulator can be run and pulled, like all other OTIS tools, on an ordinary steel wire line under pressure and without removing the tubing. Prepare against surface freezing this winter. Install your OTIS Regulator now.

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Natural Gas

Natural Gas for Wisconsin Cities Now in Prospect

MILWAUKEE.—Prospects of natural gas for Wisconsin are seen in the report that Milwaukee Gas Light Co. and others interested are laying plans for introduction of the fuel by October 1947. An unsuccessful effort was made in the 1945 state legislature to repeal a state law taxing natural gas 7 cents per 1,000 cu. ft., and to modify the law requiring permission from localities before natural gas can be brought in.

The gas company has taken steps to meet the requirements of the law, and has obtained permission from 36 of the 39 localities in which it operates to bring in natural gas. The company has made no announcement of its plans but resolutions adopted by cities, villages and towns indicate it intends to ask the Public Service Commission of Wisconsin for authority to bring in natural gas.

In a resolution adopted by the Milwaukee council it is mentioned that construction of a $70,000,000 pipe line from the Hugoton gas field in Oklahoma is scheduled to begin next March. The pipe line would be put into service in October 1947, and 3,000,000,000,000 cu. ft. of gas, estimated to be enough for 30 years, is to be made available by Phillips Petroleum Co.

Cabot Companies Asked To Justify Rates for Gas

WASHINGTON. — Federal Power Commission has ordered Cabot Gas Corp. and Godfrey L. Cabot, Inc., Boston, to appear at a hearing September 25 in Rochester, and present evidence in justification of proposed increased rates for natural gas sold to Pavilion Natural Gas Co. of Genesee, N. Y., for resale in western New York. FPC says the burden of proof is on the Cabot companies.

The commission on July 10 suspended the proposed schedule providing for rate increases after Public Service Commission of New York, the Pavilion company and the villages of Mount Morris, Geneseo, Warsaw, Avon, and Perry protested against the rates.

The commission says that Godfrey L. Cabot, Inc., is sole owner of Cabot Gas Corp., that in supplying gas to Pavilion the two Cabot corporations are engaged in a single undertaking and that their combined rates and charges must be shown to be just and reasonable if the suspended rate schedule is to be justified.

Commission Orders Close Distillate Measurement

AUSTIN. — The Texas Railroad Commission has issued an order requiring careful measurement of distillates or other liquid hydrocarbons produced from wells not connected with a cycling or repressuring plant. It applies to wells producing oil and gas from the same stratum and to gas wells.

The order requires that separators and tanks be installed on leases and prohibits removal of any liquid from the lease unless the liquid has been measured according to pipe-line rules and regulations of the commission.

Field Assistant Counsel in FPC Gas Investigation

PHILADELPHIA. — Frank Field, attorney in the public utility division of Securities and Exchange Commission, has been appointed to assist George Slaff, chief counsel in the forthcoming investigation of the natural-gas industry by Federal Power Commission. Field, who has been with SEC 7 years, expected to be released by that organization and to take up his new work at once. Associated with him in the study will be Ambrose Selig, also an SEC lawyer.

Natural-Gas Proration for Louisiana to Be Studied

BATON ROUGE.—A public hearing to discuss proration of Louisiana's natural-gas production will be called soon, according to Commissioner Joseph L. McHugh, of the State Department of Conservation. In communications sent to gas producers, operators, and pipe-line companies, to give them time to prepare data, McHugh said the hearing would be called to "more equitably distribute the market demand for gas among the wells in the state and to otherwise carry out provisions of Act 157 of 1940."

The 1940 act outlines powers and duties of the commissioners to "conserve the oil and gas resources of the state of Louisiana; to prevent waste and depletion thereof."

In his letter announcing plans for the hearing, McHugh said: "It is realized that the proration of natural gas among fields must entail great consideration because of the complexities involved. It is therefore expected that all parties at interest will present evidence and data in a systematic and orderly manner so that the Department of Conservation can make a detailed study before issuing any order."

All testimony at the hearing will be given under oath, the commissioner said.

Natural Gasoline

Wider Rural Use of Liquid Petroleum Gas Predicted

TOPEKA.—Vastly expanded use of liquefied petroleum gas on farms is predicted in the current issue of Capper's Farmer, published by U. S. Senator Arthur Capper. Household installations for this fuel are expected to be resumed at the rate of 500,000 a year, now that the war is ended, and to rise swiftly. There are still 13,000,000 homes beyond the gas mains, and they represent an immense field for widened consumption.

Delivered in large or small containers at the back door, liquefied petroleum gas provides farm housewives with fuel for cooking, water heating and refrigeration, the article points out. Future uses will include heating homes, sterilizing milk utensils or other equipment, brooder heating, pasteurizing, running tractors, killing weeds and orchard heating.

"Growth of the liquefied petroleum gas business has been phenomenal due to modern science, the petroleum industry and appliance manufacturers," the article says. "In 1922 the U. S. Bureau of Mines reported 223,000 gal. were marketed. Twenty years later the total was 585,440,000 gal. Industrial use in war production popped the gallonage to 785,000,000 for 1944. None of these figures includes uses of the gases destined for synthetic rubber or aviation gasoline.

"Household or domestic users were estimated to total 1,950,000, the last of December, 1944. They consumed 392,000,000 gal. during the year. One authority estimates 12½ per cent of the gas ranges in the United States are now operating on this fuel."

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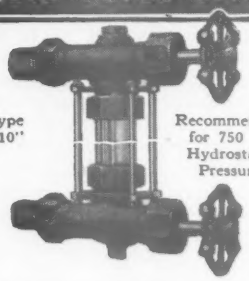

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PIPE LINES

Panama Facilities Near Completion

A $20,000,000 pipe line across the Isthmus of Panama is 95 per cent completed, according to the Navy's Bureau of Yards and Docks.

The system was originally planned to guarantee fuel supplies to the fleet, should the Panama Canal have fallen victim to enemy action. But the Navy said it proved so valuable and the needs of the Pacific fleet became so great, that the capacity of the line was more than doubled by building a duplicate even before the first was quite finished.

This pipe line system linking the two oceans has a capacity of 265,000 bbl. of fuel oil daily, 60,000 bbl. of gasoline daily, 47,000 bbl. of diesel oil daily. It can easily provide the Pacific fleet with fuel should the Canal suddenly be cut. Much of its construction is so well covered with jungle foliage that spying cameras from airplanes would be unable to trace its route. Without it, authorities point out, the Pacific fleet could have been immobilized to the point of catastrophe had the enemy been able to destroy, or seriously damage, the Panama Canal.

The plans for the pipe lines began secretly in August 1942 as the joint project of the Chief of Naval Operations, the War Department and the Petroleum Administration for War, to have a capacity of 105,000 bbl. of fuel oil daily across the isthmus, and another pipe line with a capacity of 35,000 bbl. of diesel oil or gasoline daily.

When this project was still under construction, the chief of naval operations, represented by Rear Admiral A. F. Carter, U.S.N.R., decided to broaden the original plan. It was decided to double the fuel oil capacity and lay still another line for gasoline only. The previously determined diesel and gasoline pipe line would be used for diesel fuel exclusively.

Thus there were two 20-in. fuel oil lines, one 12-in. gasoline line and one 10-in. diesel oil line. The original pipe line was completed in October of 1943, enormously relieving traffic congestion in the Panama Canal. Moreover, it released the larger and faster tankers for overseas use in the Pacific and made possible use of slower and smaller ones for shuttle service between Cristobal, the mouth of the pipe line on the Atlantic side, and the refineries in the Carribean Sea.

On the Pacific side the terminal of the pipe line is at Balboa. The line extends 35 miles between tank farms on either end, and then for about 5 miles from the tank farms to the shore, giving the project a total of some 46 miles. Originally conceived as solely an auxiliary, the heavy war traffic through the Canal and the desperate need for tankers gave it another and equally vital function. It has, in effect, given the Navy an additional tanker fleet for operation in the Far Pacific.

The $20,000,000 cost includes the pipe lines, terminal facilities, piers, ballast water plants and pumping stations. The work was done on Navy contract, by the Williams Brothers Corp. S. Miller Williams, jr., president; David R. Williams, vice president; Guy S. Connors, vice president, and A. M. Garber, superintendent, have spent much time at the Panama project.

David and S. Miller Williams personally were awarded meritorious service pins for their work on the pipe line, by the navy department, and their company was awarded the Army-Navy "E" for excellence of work.

Army Lays 20 Miles In 27 Hours

United States Army engineers built a 20-mile pipe line from Yokohama to Atsugi airfield in Japan in 27 hours to fuel planes using the field. This was accomplished soon after Army forces landed in Japan.

Great Lakes Takes Bids for Project

Great Lakes Pipe Line Co. will begin work October 1 on a project to lay 600 miles of 8-in. pipe.

The project includes a 200-mile line from Barnsdall, Okla., to Kansas City, and an extension from Kansas City to Omaha, Sioux City, Iowa, and Sioux Falls, S. Dak. If pipe is available, work on the entire project will begin next month.

Work will begin at once on terminals at Sioux City and Sioux

Falls, contracted by D. C. Bass & Sons of Enid, Okla.

The Great Lakes company received bids for laying pipe for the Barnsdall-Kansas City section last week and for the extension to Sioux Falls this week. Contracts are to be let soon.

Iraq Lets Contract For 16-In. Pipe

A contract to supply 120,000 tons of 16-in. pipe for Iraq Petroleum Co.'s pipe line from Kirkuk, Iraq, to Haifa, Jerusalem, has been given the firm of Stewarts & Lloyds, Ltd. This is believed to be the largest such order ever placed in the United Kingdom.

Announcement of the order followed by one day the disclosure in Bagdad that preliminary work on the pipe line has been started and that construction will begin next spring.

It is the company's intention to increase output in the Kirkuk fields to a maximum of 10,000,000 tons annually, from the present 4,000,000 tons. At the same time, exploration has been resumed in the Basrah concession area of southern Iraq, where drilling operations, by agreement, start 2 years from now.

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Russia Orders Compressors For Natural-Gas Pipe Line

The 500-mile natural-gas line of 16-in. and 18-in. pipe extending from Saratov, in the Ural Mountain gas-producing section, to Moscow, Russia, will be equipped with American compressors.

Cooper-Bessemer Corp. has an order for twenty-four 1,000-hp. 10-cylinder compressor units. Clark Brothers Co., Inc., is furnishing twelve 1,000-hp. compressor units. Other orders for heavy-duty equipment have been purchased under lend-lease agreement through the U. S. Treasury Department.

Shell Reconditions in Texas and Oklahoma

Shell Pipe Line Corp. is reconditioning 127 miles of pipe line and repairing tanks in Texas and Oklahoma. On the McCamey-Cushing line, 55 miles is being reconditioned by Smith Contracting Co. near Archer City, Tex. On the McCamey-Houston line Anderson Brothers Construction Co. is reconditioning 52 miles in the Big Lake-El Dorado section.

Between Cushing and Osage, Okla., 30 miles of 10-in. are being reconditioned by H. C. Price Co. where parallel welded line procedure is being followed which Shell used in recent years on the East Texas system.

Chicago Bridge & Iron Co. is replacing pontoon-type roofs and upper rings of nine tanks in Texas and one at Cushing, all of which have been in sour crude service.

France Negotiates for U. S. Army Pipe Lines

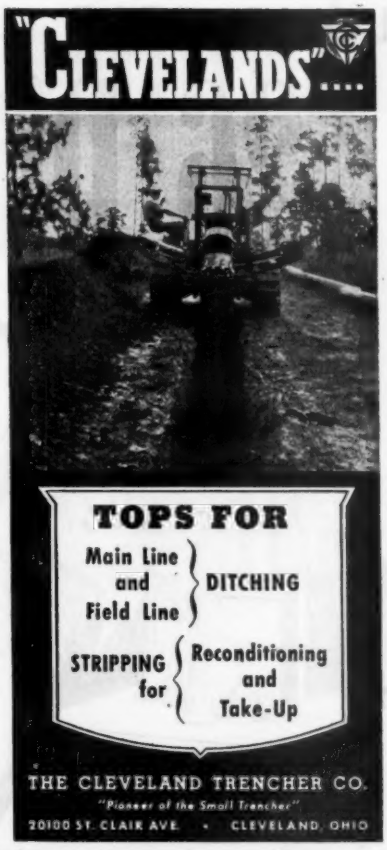
The French Government is negotiating with the American Military Surplus Commission to acquire any or all the oil pipe lines which U. S. troops laid across France to the Rhine.

The French have lost hope of acquiring the following lines laid to carry oil to the front as the European battlefield extended to the German frontier and on beyond the Rhine:

1. A line running from Cherbourg through St. Lo and on across the Rhine to Mainz. This is a 6-in. pipe line extending 1,500 miles.

2. Le Havre to Port Jerome, 23 miles of 4-in. Antwerp to Wesel, 400 miles of it 4-in. and 190 miles of 6-in.

3. Fort Debouc near Marseille through Lyon to Sandhofeo, crossing the Rhine at Frankenthal, north of Mannheim.



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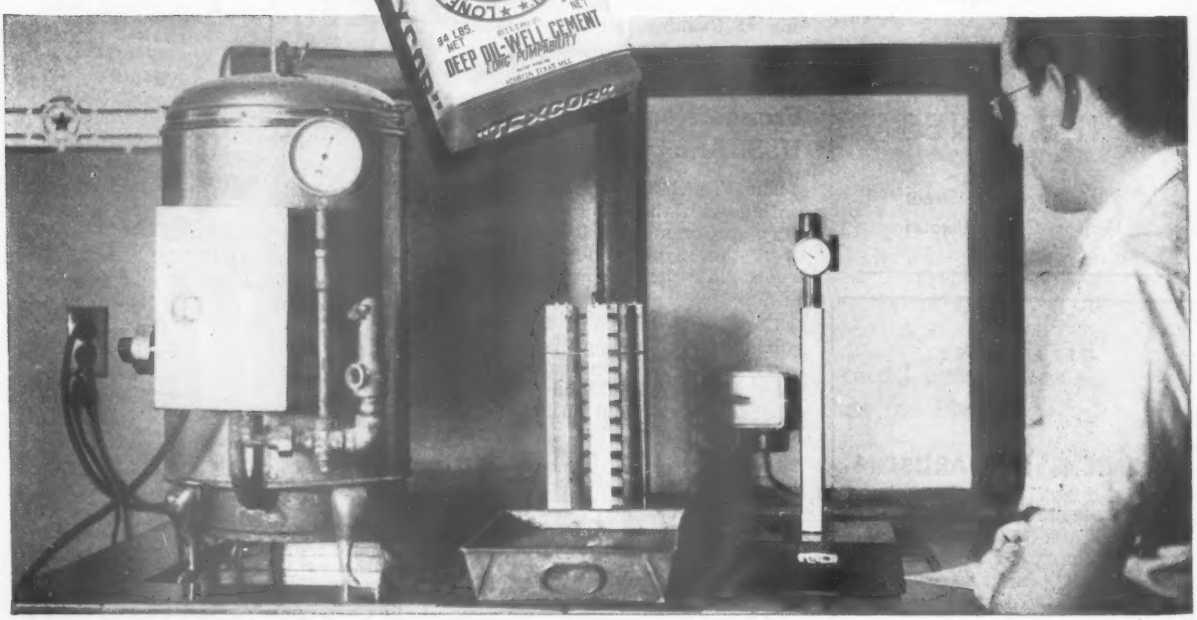

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Exploration and Drilling

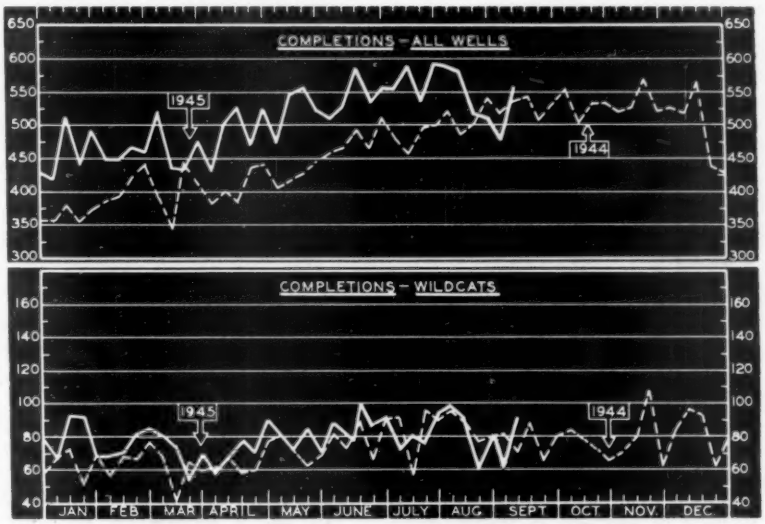
Week's Highlights

THE ending of federal government well spacing is the signal for a fresh appraisal among operators of the whole question of proper spacing. In Mississippi, the state has adopted, practically intact, the wartime pattern. In Oklahoma, the new Lindsey pool, producing from 11,000 ft., is the subject of two proposals to the state, one asking 80-acre spacing, the other seeking 10-acre units. In Michigan the Coldwater and Deep River pool operators may seek 20-acre spacing from the state to replace the 40-acre wartime unit.

It is not surprising that many changes are sought. Neither is it surprising that the operators in some areas appear fairly well satisfied. Wartime regulations had one major purpose, conservation of steel. The yardstick used was barrels of oil obtained per ton of steel used.

In peacetime the industry uses the yardstick of dollars of net profit obtained per dollar invested. Steel represents a large proportion of the investment dollar, and frequently reflects the remaining portion of the investment dollar quite accurately. Therefore operators in such areas will be content to retain the wartime spacing pattern. In other areas the steel cost does not reflect the total investment dollar so accurately, and here there will be a desire for change.

The reason is that for any given depth, the steel cost will be about the same. But, taking a 6,000 ft. case for an example, one pool is in an area of soft formations and easy drilling, another pool requires a lot of tough rock bit drilling. Here the



Solid line charts current weekly completions, service wells in Eastern area included

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 8, 1945

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1945				
	Comp.	Oil	Gas	Dry	Footage	1945	1944	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	34	17	0	*17	49,716	987	1,098	0	0	0	0	0	0	0	0	0	0
Pennsylvania	93	46	12	†35	162,159	2,825	2,798	0	0	0	0	0	0	0	0	0	0
West Virginia	23	4	11	8	52,626	556	599	0	0	0	0	0	0	0	0	0	0
Ohio	22	6	5	11	72,065	623	675	0	0	0	1	1	0	0	11	42	53
Indiana	0	0	0	0	0	132	158	0	0	0	0	0	5	0	0	22	27
Kentucky	17	10	3	4	34,422	357	495	0	0	0	1	1	17	0	2	34	53
Illinois	34	16	0	18	90,688	1,189	1,253	4	0	0	7	11	34	0	0	211	245
Michigan	29	8	3	18	73,428	510	434	1	0	0	13	14	7	0	3	174	184
Kansas	35	17	2	‡16	114,809	1,161	1,244	2	0	1	5	8	26	0	12	239	277
Neb., Mo., Iowa	1	0	0	1	1,500	18	22	0	0	0	1	1	0	0	0	13	13
Oklahoma	42	23	3	16	142,419	1,637	1,189	1	0	0	6	7	61	2	14	249	326
Texas	120	69	12	39	554,628	4,911	3,767	4	0	0	17	21	148	12	43	870	1,073
North Central	42	21	0	21	125,671	1,497	1,016	0	0	0	7	7	56	0	5	312	373
West	31	24	0	7	162,352	1,237	1,047	2	0	0	4	6	41	1	0	182	224
Panhandle	12	3	9	0	38,861	389	163	0	0	0	0	0	0	0	1	5	6
Eastern	9	2	3	§4	60,666	228	222	0	0	0	2	2	5	6	1	57	69
Gulf Coast	21	16	0	5	146,319	1,107	827	2	0	0	3	5	33	4	29	189	255
Southwest	5	3	0	2	20,759	453	492	0	0	0	1	1	13	1	7	125	146
Louisiana	31	16	4	11	233,044	705	543	2	0	1	5	8	24	3	6	90	123
Northern	16	10	4	2	93,897	271	212	0	0	1	1	2	6	1	6	50	63
Southern	15	6	0	9	139,147	434	331	2	0	0	4	6	18	2	0	40	60
Arkansas	3	3	0	0	10,139	122	154	0	0	0	0	0	0	0	0	28	28
Mississippi	3	3	0	0	18,364	243	97	0	0	0	0	0	5	0	0	80	85
Southeastern	0	0	0	0	0	40	30	0	0	0	0	0	0	0	1	27	28
Montana	8	7	0	1	21,043	214	245	0	0	0	0	0	7	0	0	18	25
Wyoming	5	4	0	1	22,064	140	113	2	0	0	1	3	14	0	0	26	40
Colorado	1	0	0	1	3,890	26	23	0	0	0	1	1	1	0	1	5	7
New Mexico	13	5	0	8	47,469	297	270	0	0	0	7	7	8	0	4	43	55
California	43	30	1	12	168,282	1,615	1,358	0	0	0	8	8	2	0	2	165	169
Total United States	557	284	56	217	1,872,755	18,308	16,565	16	0	2	73	91	359	17	99	2,336	2,811
Total previous week	476	258	56	162	1,541,215	17,751	16,032	7	0	5	49	61	343	17	97	2,263	2,720
Total Sept. 9, 1944	535	285	53	197	1,709,516	16,565	11,834	13	0	1	57	71	301	20	87	2,196	2,604

Service wells included: *17, †31, ‡1, §1.

steel yardstick results are about the same, but the dollar yardstick gives entirely different answers. Operators in pools where drilling is soft and cheap will be more inclined to seek changes than those in pools of the same depth where drilling is tough and expensive.

Add one more complicating factor, ultimate oil production per well. Two fields of the same depth may have widely varying acre yields from identical spacing patterns. Acre yield is more a function of thickness of pay sand than of depth. The dollar yardstick will show a wide difference between the two pools, the steel yardstick might not show the same differences.

Putting together the various possible combinations of easy and tough drilling with high, medium, and low acre yields, will result in a wide variation of desirable spacing units, when measured by the dollar yardstick.

N. CENTRAL TEXAS

1,200-Bbl. Discovery Made in Wichita County

WICHITA FALLS.—W. H. Hammon and Hanlon-Buchanan 1 Boone, Block 29, Cowherd Bros. Subdivision, wildcat 8 miles southwest of Iowa Park in southern Wichita County, has been completed to flow at the rate of 1,200 bbl. of 42-gravity oil in 24 hours through ¾-in. choke. Production is from the Strawn through perforations at 4,168-4,210 ft. Gas-oil ration was 200 to 1.

Kerlyn Oil Co. 1 Bryan, Block 1902, TE&L Survey, wildcat 3 miles northeast of Jean in northern Young County, flowed 219.26 bbl. of 43-gravity oil in 12 hours through 20/64-in. tubing choke on official test. The well is producing through perforations at 4,315-18 ft. in the Caddo. Gas-oil ration is 710 to 1, total depth is 5,521 ft. Dwight M. Ross will drill 1 F. V. Hinson, a 5,200-ft. wildcat, 3½ miles northwest of Jean. It is 1,401 ft. from the south line and 467 ft. from the west line of Block 1454, TE&L Survey.

Manning & Brown 1 Nichols, Lot 2, Block 50, ATNCL Survey, wildcat 3 miles northeast of the Hull-Silk pool, Archer County, on official test flowed 169.64 bbl. of 44.6-gravity oil in 10 hours through perforations at 5,488-5,543 ft. in the Ellenburger. Gas-oil ration was 850 to 1. Continental Oil Co. 1 Corpening, Block 6, Limestone County School Land Survey, west offset to the discovery in the new Johnson pool of western Montague County, drilled conglomerate with stain and odor of oil at 6,222-73 ft. On a drill-stem test at 6,262-73 ft., 95 ft. of drilling mud with no shows of oil or gas was recovered. It was drilling below 6,285 ft. in shale.

Gatewood field, Cooke County, had five completions and the Wilson field, also in Cooke County, had four. Archer County reported 12 new field locations. Young County 10 and Wichita County 9.

In West Central Texas, Stephens County had two field completions. Coleman County had two new field locations.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Geo. Proctor 1 Langford Investment, Blk. 129, J. W. Harris Subd. Club Ranch, 3 mi. N and 2 mi. W Archer City, Caddo 5,037 ft., dry, TD 5,135 ft.

Cooke County: W. R. Bourland et al 1 J. H. Cone, Eleanor Langford Sur. A-566, 5 mi. S and 3 mi. W Muenster, elev. 1,070 ft., dry, TD 3,263 ft.

Wichita County: Stanolind 1 J. E. Roller est., CTRR Sur. A-438, 5 mi. S and 1½ mi. W Burkburnett, elev. 1,059 ft., Ellenburger 4,390 ft., dry, TD 4,662 ft.

Nixon Pet. Co. 1 W. F. Heiserman, Juan Armendaris Sur. A-10, 3½ mi. S Clara, elev. 1,124 ft., Ellenburger 4,704 ft., dry, TD 4,787 ft.

Young County: Baker & Winfrey 1 B. P. Grigsby, Sec. 415, TE&L Sur., 1 mi. E and ½ mi. N Newcastle, elev. 1,212 ft., Home Creek 1,028 ft., dry, TD 1,588 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Jones County: Ted Weiner et al and James C. Roberts 1 Anetta Lee Gray, Sec. 25, Deaf & Dumb Asylum Land, 1½ mi. S Avoca, elev. 1,565 ft., dry in Cook, TD 1,911 ft.

Stephens County: Sinclair Prairie 1 J. L. Ackers, J. M. Evans Sur., 2½ mi. NW Breckenridge, elev. 1,223 ft., Mississippian 4,445 ft., Ellenburger 4,455 ft., dry, TD 4,530 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Sept. 8 crude oil	Distillate, allied products	September PAW quota all oils	Sept. 1 crude oil
Alabama	1,000	.....	500	1,000
Arkansas	78,800	5,400	80,400	78,650
California	880,400	60,970	946,970	884,750
Colorado	11,300	.....	12,000	12,300
Eastern	68,650	6,300	72,500	65,750
Florida	.....	.....	.....	200
Illinois	205,050	12,000	212,000	200,600
Indiana	14,650	.....	13,000	13,400
Kansas	255,200	4,500	278,500	272,050
Kentucky	28,500	2,600	30,600	28,700
Louisiana	362,650	42,000	592,000	365,900
North Louisiana	70,650	.....	.....	70,200
South Louisiana	292,000	.....	.....	295,700
Michigan	48,800	800	47,800	46,450
Mississippi	55,750	.....	47,000	54,350
Montana	23,300	300	22,300	23,300
Nebraska	850	.....	1,000	850
New Mexico	107,250	6,800	106,800	103,500
Oklahoma	391,150	28,000	408,000	390,100
Texas	1,889,500	166,000	2,144,000	2,222,700
East Texas	315,300	.....	.....	380,900
East Central Texas	128,450	.....	.....	145,600
North Central Texas	141,900	.....	.....	152,850
Texas Panhandle	88,000	.....	.....	88,000
West Texas	452,000	.....	.....	526,650
Southwest Texas	296,150	.....	.....	361,100
Texas Gulf Coast	467,700	.....	.....	567,600
Wyoming	102,950	3,500	96,700	107,500
Total United States	4,525,750	339,170	4,912,070	4,872,050
Change from prev. week	down 346,300			

Total production January 1-September 8, 1945 ..... 1,209,537,925 bbl.
Same period last year ..... 1,134,176,350 bbl.

SOUTHWEST TEXAS

Live Oak County Is Given New Gas Field

CORPUS CHRISTI.—A new gas pool is being opened in Live Oak County by Ivy & Morgan 1 William Hinnant, in Alex McDonald Survey, 11 miles northwest of Mathis. This discovery is being completed in the 2,300-ft. sand with pressure of 1,000 lb. on tubing and 1,200 lb. casing. The test was drilled to approximately 6,000 ft. before plugging back for completion at the higher level.

P. R. Rutherford 1 Thos. P. Traylor, wildcat, 4 miles southeast of Bloomington, in the Agaton Sisneros Survey, in Calhoun County, is dry at 7,143 ft.

In Duval County, 3 miles northeast of Freer, Bennett Brothers Drilling Co. 1 Jas. F. Welder, wildcat in Survey 213, was found dry at a total depth of 2,757 ft. Government Wells sand was topped at 2,512 ft., Loma Novia at 2,550 ft., and Mirando at 2,700 ft.

Hewit & Dougherty 1 Josephine Mitchell estate, a wildcat 5 miles northeast of Placedo, in Victoria County, is dry at 8,008 ft., with no shows reported.

There were 32 new locations reported this week with 9 wildcats. The wildcats are scheduled one each for Bastrop, Bee, Goliad, Jim Wells, Karnes, Live Oak, Refugio, San Patricio, and Starr counties. Of the 12 completions, 10 are field producers with only 2 dry holes, one of these being a wildcat in Duval County. Nueces and Willacy counties led with 2 producers each.

SOUTHWEST TEXAS WILDCAT FAILURES

Duval County: Bennett Brothers Drilling 1 Jas. F. Welder, Sur. 213, 3 mi. NE Freer, dry at 2,757 ft.

APPALACHIAN FIELD

Peoples Natural Starts Third Test in Fairfield

PITTSBURGH.—In Fairfield Township Westmoreland County, southwest Pennsylvania, Peoples Natural Gas Co. has started drilling a third wildcat on the Camilla F. Giffin tract scheduled for the Oriskany sand. Two previous tests on this structure failed to reach the Oriskany being abandoned because of running regionally very low on structure.

In Washington County, Ed Beedle et al completed the test on William McNary farm in Nottingham Township as a 20-bbl. well after shot. It extends produc-

BAASH-ROSS

Baash-Ross News

BAASH-ROSS TOOL COMPANY · LOS ANGELES · HOUSTON · NEW YORK

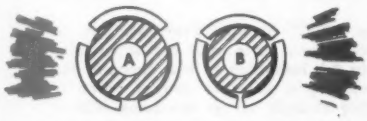
OUR 25th YEAR

How to stop fishing jobs *Before they start*

The 1-2-3 of using a BAASH-ROSS SAFETY CLAMP

1. HERE'S WHERE THE TROUBLE STARTS. It's practically impossible to drill an oil well without frequently running up against the problem of supporting a string of drill collars in the table while you make-up or break-out joints. If you are using ordinary rotary slips to grip the collars, you're playing with dynamite *unless you provide some means of safeguarding the collars against dropping through the slips.* Here's why...

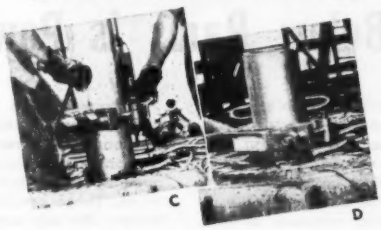
Standard rotary slips have a fixed curvature. They give a full safe grip *only* when the collar *exactly* fits that curvature. But drill collars are continually changing diameter as they wear away from grinding against the abrasive fresh-cut walls of the hole. So slips that fit the curvature of a new drill collar (A) become less and less efficient as the



collar wears (B). To make matters worse, the hard heat-treated surface of the drill collar makes it increasingly difficult for the slips to get an adequate "bite" to hold the string. Result—a constantly greater risk of the collar dropping through the slips... and a costly difficult fishing job on your hands!

2. HERE'S HOW TO CORRECT IT. Because it's *always* risky business to support drill collars with regular rotary slips, make it rule number one of your rig operations that a Baash-Ross Safety Clamp should always be placed around the collars above the slips before letting go with the elevators. It takes only a minute. Simply wrap the Safety Clamp around the collar and tighten a single nut with a quick-acting wrench (C). That's all you do.

Each segment of the Safety Clamp has an individual spring-loaded slip that takes a firm initial grip on the collar the instant the Clamp is tightened. Should the drill collar start to drop through the slips, it can drop only as far as the Safety Clamp before it is stopped cold (D). Even a sudden heavy jar



can't loosen the grip of the Clamp because each individual slip only wedges tighter as the load increases. Yet the Clamp can be quickly released when desired by simply loosening the nut.

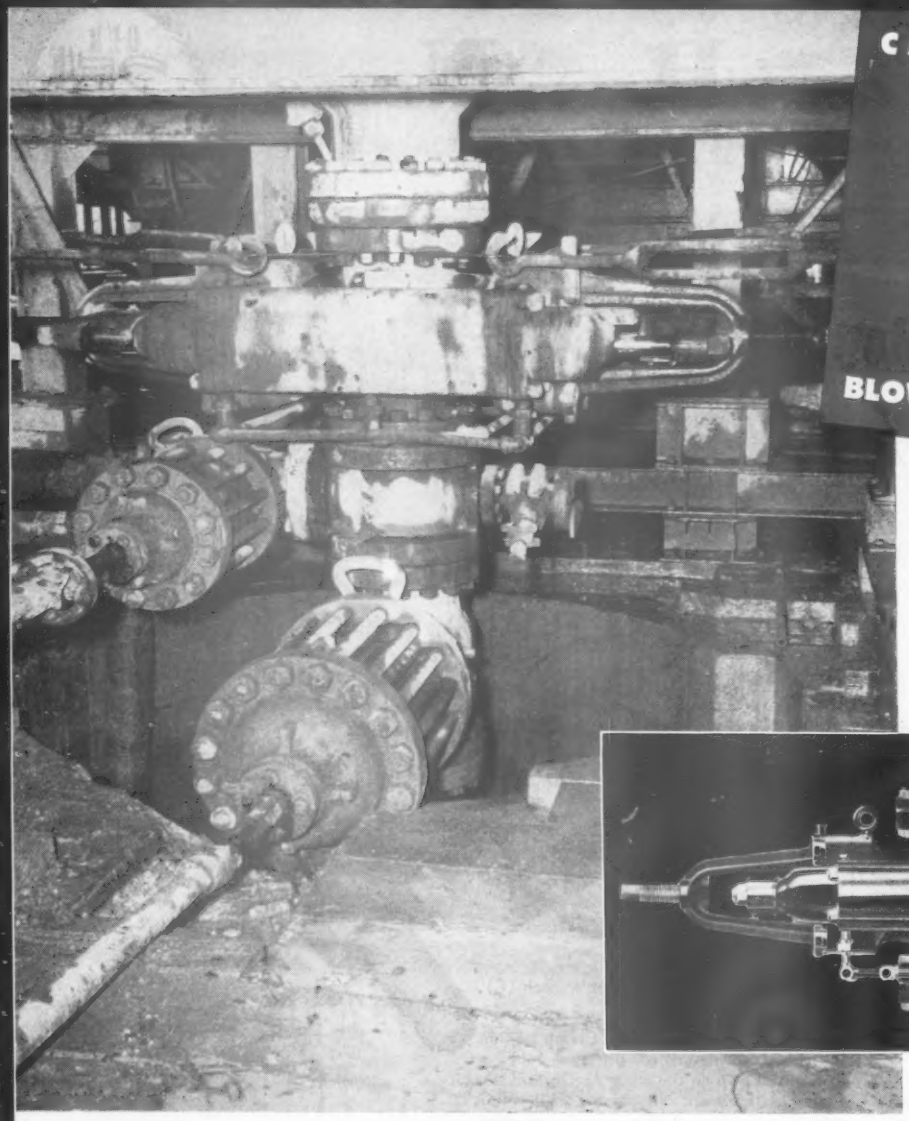
It's quick... safe... and as good insurance against fishing jobs as you can buy!

3. AND THERE ARE MANY OTHER USES. Safeguarding drill collars against dropping down the hole is only one of *many* valuable ways the Baash-Ross Safety Clamp can step up the efficiency of your rig operations ● Use it to safeguard production liners, screens and other flush-surfaced equipment

against dropping in the hole ● Use it as an emergency elevator shoulder when lifting or handling twist-offs and other collarless pipe (E). Typical is the fishing job where—after removing the fishing tool—only the flush top of the twist-off was left sticking up in the table and no way to catch it with the elevators. The operator simply attached a Baash-Ross Safety Clamp, latched the elevators under the Clamp and safely lifted a 4000′ string far enough to get a tool joint in the clear ● Another use for the Safety Clamp is for holding gravel-packed liners in the table while the string is being made up. Most of these liners have too short a neck to catch with elevators. So just attach a Safety Clamp in this space and support the liner through a "U"-plate on the table (F). Leaves ample room for tongs.

THE BAASH-ROSS Safety Clamp comes complete in a handy all-steel storage box and can be quickly adapted to fit any diameter from 3¾" up by simply adding or removing links—a job that takes only a minute. Get full details on this tool from your Baash-Ross representative, see page 265 of your Composite Catalog... or write direct!

XUM

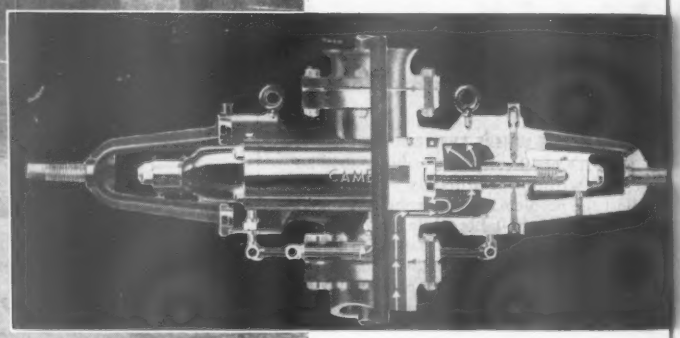


CAMERON TYPE

"QRC"

BLOWOUT PREVENTERS

CONQUER WELL PRESSURE AND *PUT IT TO WORK!*



WELL PRESSURE

Pressure By-Pass Below Rams Is Powerful Closing Aid

Here is an under-the-floor view that is fast becoming a familiar scene in the field . . . a Cameron Pressure-Operated Drilling Control hook-up assembled around the new Cameron Type "QRC" Blowout Preventer. With Cameron Type "DV" Pressure-Operated Gate Valves to guard against loss of control while pipe is out of the hole, or thru the flowline, the "QRC" Blowout Preventer contributes the final measure of protection required to close the well bore during drilling operations.

The above cross-section illustration clearly demonstrates one of the outstanding features of this drilling control unit . . . the use of well pressure in closing the rams and maintaining the seal. It is this feature that accounts for the high ratio of closing pressure to well pressure, 8 to 1 as compared to 3 to 1 on earlier models. When the rams are closed, well pressure will automatically hold them in that position until the ram locking screws are made up.

The rams of the Type "QRC" Blowout Preventer can be changed with remarkable ease . . . in only a few minutes. The change requires only the loosening of four hammer lug nuts on each bonnet, turning a pressure control valve to "open" position and lifting straight up on the rams with a catline. These operations in reverse order complete the ram change. An experienced crew can make the change in 5 minutes, and even inexperienced crews should be able to do the job in 15 or 20 minutes.

In addition to these and other entirely new mechanical features, the Cameron Type "QRC" Pressure-Operated Blowout Preventer makes generous use of the numerous proven features of earlier Cameron models, including the famous Cameron patented self-feeding ram packing element.

Complete details will gladly be sent to interested operators on request.

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tion over 2,000 ft. The producing formation is the Fifty Foot sand, topped at 2,320 ft. with oil at 2,361 ft. and total depth 2,373 ft. The Injun sand was logged 1,595-1,848 ft., Squaw 1,860-1,940 ft., Thirty Foot 2,150-2,225 ft., Gantz 2,298-2,315 ft.

In Luzerne Township, Fayette County, Peoples Natural Gas Co. completed a good gas well in the test on Harry B. Hogsett which gaged 1,245,000 cu. ft. from the Injun sand topped at 1,832 ft.

In Elk district, Kanawha County, West Virginia, R. E. McCabe completed a fair gas well as an Oriskany test on Fred J. Thabet lease with a final open flow of 3,540,000 cu. ft. gas. The Corniferous lime was at 5,200 ft., Oriskany 5,330 ft. and total depth 5,351 ft. In this district, this operator drilled the test on Jesse A. Thomas through the Oriskany A and B members and except for a showing of oil and gas in the B member, it was dry. The Corniferous lime was topped at 4,833 ft., Oriskany 4,955-86 ft., lime break 4,986-5,001 ft., sand 5,001-15 ft., oil and gas show 5,008 ft., total depth 5,017 ft.

PERMIAN BASIN

Silurian Pay in Offset To Permian Discovery

MIDLAND.—Humble Oil & Refining Co. 1 Parker, Section 24, Block A-41, Public School Land Survey, ¼ mile west of Sun Oil Co. 1 Martin, Permian lime discovery in central Andrews County, offers prospects of deeper production from the Silurian. This test went from the Permian to the Silurian. Elevation is 3,325 ft. On a 65-minute drill-stem test in the Silurian at 7,994-8,167 ft. gas came to the surface in 10 minutes, estimated at 500,000 cu. ft., and recovery was 350 ft. of free oil and 180 ft. of oil and gas-cut mud. Gravity of the oil was 43.2°. It was drilling ahead at 8,232 ft. in lime. It is scheduled to drill to 10,000 ft. if necessary to explore the Ellenburger.

Sinclair Prairie Oil Co. 1 Ratliff, Section 25, Block 73, Public School Land Survey, southwestern Andrews County wildcat, after encountering saturation in the Devonian, ran a 1-hour drill-stem test at 9,069-9,200 ft., but recovered only the 350-ft. water blanket and 60 ft. of drilling mud. Elevation is 3,223 ft. Operator is drilling ahead. Five and one-half miles northwest of this test, Shell Oil Co., Inc., and The Texas Co. 1 Ratliff & Bedford, Section 4, Block 73, Public School Land Survey, discovery to be dually completed from the Devonian and the Ellenburger, was squeezing after perforating casing with four shots at 9,180-82 ft.

Ector County.—Texas 29 W. E. Connell, Section 9, Block B-16, Public School Land Survey, 2 miles west of the Penwell field in southern Ector, topped the Devonian at 7,048 ft. A 40-minute drill-stem test at 7,035-7,108 ft. failed to recover shows of oil or gas. Stanolind Oil & Gas Co. 1 Williamson, Section 5, Block 45, T-1-N, T&P Survey, wildcat in extreme northwestern Ector, cored 6 ft. of dolomite with fair porosity and bleeding oil at 4,496-4,511 ft. It is scheduled to run casing, then drill ahead. Stanolind 3-Q Scharbeuer, Section 12, Block A, PSL Survey, prospective discovery from both the Clear Fork and Wichita Albany at the north end of the Goldsmith pool, cored to 7,715 ft. through green and gray shale with streaks of lime. There were no shows of oil or gas. Operator is coring ahead.

Texas Gulf Producing Co. 1 Slaughter, League 113, Potter County School Land Survey, wildcat 3 miles west of the Dean Pool, Cochran County, was acidized with 2,000 gal. at 5,010-63 ft., flowed 28 bbl. of oil in 2½ hours and died. On pumping test it made 66 bbl. of oil in 6½

(Continued on page 150)

TEXAS GULF COAST

New Oil Sand Found In Blue Lake Field

HOUSTON.—New oil sand in the Blue Lake area of Brazoria County has been opened by Glenn H. McCarthy 1 T. J. McMillan estate, in Geo. Robinson Survey, Abstract 126, near the west side of Horseshoe Lake. Drilled to a total depth of 9,044 ft., with 7-in. casing set to 9,035 ft., perforations were made with 64 holes at 9,000-08 ft. in sand topped at 8,996 ft. On a Railroad Commission potential test it flowed 238.35 bbl. per day of 30.4-gravity oil, trace of water, tubing pressure 825 lb., gas-oil ratio 450 to 1.

New oil discovery in Colorado County is Skelly Oil Co. and Warren Petroleum Corp. 1 R. Hamel estate, 9 miles southwest of Columbus, in Richard Dowdy Survey. On Railroad Commission potential it flowed 194.63 bbl. per day through a 3/16-in. choke, tubing pressure 2,100 lb., gas-oil ratio 6,878 to 1, gravity 46.3°, 1,338,000 cu. ft. gas per day, no water. Production is from the Wilcox with perforations at 9,052-69 ft. Total depth is 9,706 ft., with 5½-in. casing set at 9,580 ft. Location for offset to this discovery has been staked by Skelly as their 1 Clara Berthold, also in the Richard Dowdy Survey.

Pan American Production Co. is dual-completing its 1 J. M. Winslow heirs, which is more than a mile northeast of production at the Pinehurst field in Montgomery County, through perforations at 10,985-11,005 ft. and 10,325-45 ft. The lower level had been tested last week and flowed gas-condensate. Later the 10,325-ft. level was tested and the flow was 25 bbl. of condensate per day with 1,500,000

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cu. ft. of gas per day through a ¼-in. choke. Total depth of the hole is 11,145 ft., with 5½-in. casing set to 11,143 ft.

Cities Service Oil Co. 1 John Schobal, northeasterly extension of the Columbia field, in Edwin Allard Survey, is trying for completion as an oil well in the 7,850-ft. sand. A drill-stem test through perforations at 7,857-59 ft., using ¼-in. and ⅜-in. chokes, flowed 135 bbl. of oil per hour, gravity 39.8°, no water, with 610 lb. working pressure. Tubing is being run to complete. On previous tests through perforations at 7,859-63 ft. the well showed oil and water. Total depth is 9,752 ft. with 5½-in. casing set to bottom. Four different sands in this well had shown for gas-condensate production,

(Continued on page 150)

SOUTH LOUISIANA

South St. Gabriel Field Discovered in Iberville

NEW ORLEANS. — Discovery well for the South St. Gabriel field in Iberville Parish is Noble & Baker 1 W. E. Caldwell, 52-9s-2e. Drilled to a total depth of 9,305 ft., with 5½-in. casing at 9,305 ft., it flowed a potential of 115 bbl. per day of 43-gravity oil, through an 11/64-in. choke, gas-oil ratio 3,053 to 1, tubing pressure 1,200 lb., casing pressure 500 lb., 62 per cent water. Production is from 20 perforations at 9,210-14 ft.

Shell Oil Co., Inc. 3-A Dugas & LeBlanc, 40-12s-13e, is a new producer for the Napoleonville dome in Assumption Parish. It flowed a potential of 312 bbl. per day through a 9/64-in. choke from perforations at 6,877-86 ft., tubing pressure 1,280 lb., gravity 39°, no water. Total depth is 6,906 ft. is sidetracked hole.

Humble Oil & Refining Co. 1-A Mrs. J. A. Bel, 33-5s-4w, a wildcat in the Oberlin area, is waiting on cement with 9⅝-in. casing set to 9,470 ft. Total depth is 9,702 ft. The casing was set through the gas shows found at the 9,410-20-ft. level.

In Calcasieu Parish, Sparta Oil Co. et al 1 Industrial Lumber Co., 25-8s-12w, is dry at 8,005 ft.

Vincent & Welch and Nichlos Drilling Co. 1 August Leonard, wildcat, 29-7s-1e, in Acadia Parish, is dry at 10,013 ft.

All of the 15 new locations this week are in proven areas. Acadia, Cameron, Jefferson Davis, and LaFourche parishes each had two locations. Of the 15 completions 6 are wildcats, 2 discoveries, 1 each in Iberville and St. Mary parishes, 4 dry, 1 each in Acadia, Calcasieu, Cameron and Plaquemines parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Iberville Parish: New oil pool, South St. Gabriel—Noble & Baker 1 W. E. Caldwell, 52-9s-2e, TD 9,305 ft., perf. 9,210-14 ft., PT 115 bbl. daily through an 11/64-in. choke, gas-oil ratio 3,053, tubing pressure 1,200 lb., casing pressure 500 lb., gravity 43°, 62 per cent water.

St. Mary Parish: New oil pool, South Jeanerette—Atlantic Refining 1 Joseph A. Blanchard, 37-13s-9e, TD 8,159 ft., perf. 7,476-84 ft., PT 211 bbl. daily through a ⅛-in. choke, gas-oil ratio 478, tubing pressure 1,200 lb., gravity 34.6°, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Vincent & Welch, Nicklos Drilling 1 August Leonard, 29-7s-1e, dry at 10,013 ft.

Calcasieu Parish: Sparta Oil et al 1 Industrial Lumber Co., 25-8s-12w, dry at 8,005 ft.

Cameron Parish: Claude F. Morgan 1 LeBlanc heirs, 31-14s-8w, dry at 9,518 ft.

Plaquemines Parish: Sid W. Richardson 1 Magnolia Orange Grove, 8-18s-26e, dry at 12,401 ft.

CANADIAN FIELDS

Vera-Unity Field Is Extended South and East

CHATHAM.—In the Vera-Unity field, western Saskatchewan, Bata Petroleums 9 has finished in basal lower Cretaceous at 2,082 ft. with 3,700,000 cu. ft. and 790 lb. pressure. This completion extends the field a mile south and east and increases the aggregate open flow potential to around 110,000,000 cu. ft. from six wells, with proven area around 3,000 acres.

In the Steveville field, eastern Alberta, Empire Pacific 1, LSD 1, 27-19-12w4, finished at 3,323 ft. and pumped 47 bbl. initial production. Empire-Pacific 2, LSD 16, 22-19-12w4, drilled to 4,300 ft., failed to get production in the Devonian and was plugged back to perforate and test at 3,314-18 ft., making around 6,000,000 cu. ft. wet gas. Two tests are drilling and two starting.

Lloydminster. — In the Lloydminster field, east central Alberta, Smyth 1, LSD 16, 21-49-1w4, finished at 1,977 ft., has 25 bbl. initial pumping production. Ponokla 1, LSD 8, 12-49-1w4, total depth 1,881 ft., is testing. Lloydminster Oil Producers 2, LSD 8, 9-50-2w5, total depth 1,990 ft., is testing.

Coalspur.—In the northern Alberta foothills, Imperial-Coalspur 1, LSD 10, 3-49-21w5, deepest well in Alberta, is dry. After drilling was halted at 12,955 ft. owing to mechanical troubles, efforts were made to plug back to test showings in upper horizons, but collapse of 7-in. casing at 7,000 ft. necessitated abandonment.

MICHIGAN

Year's Drilling Peak Reached This Week

SAGINAW. — Drilling reached a peak for the year in Michigan last week with 29 completions for 8 oil wells, 3 gas wells, 18 dry holes, of which 13 were wildcats, while 13 new locations were announced.

Among the dry holes was the Wild 1 State in Hampton Township, Bay County, a Saginaw Bay shore test that prompted the current controversy between the state conservation department and Saginaw Valley conservationists. The test was halted at 2,910 ft. in salt water after encountering a oil show insufficient for withdrawal purposes at 2,730 ft. in Dundee formation.

The expected spurt in new activity failed to materialize because the state oil advisory board and P. J. Hoffmaster, supervisor of wells, chose to continue the 40-acre drilling unit for Michigan, although Petroleum Administration for War rescinded the conservation war measure. A public hearing on the 40-acre minimum and the existing drilling pattern in 24 state oil pools is to be continued at least until after the state advisory board holds a public hearing on September 14.

MICHIGAN SUCCESSFUL WILDCAT

Allegan County, Heath Township: S. L. McCall 1 Edward Erwin, Sec. 31-3n-14w, pumped 20 bbl. and salt water, after acid, TD 1,470 ft.

MICHIGAN WILDCAT FAILURES

Antrim County, Mancelona Township: Sun Oil 1-A State-Mancelona, 10n-5w, dry, TD 2,670 ft.

Clare County, Lincoln Township: Turner Petroleum 1 Frank A. Luce, S½ NW SW 5-18n-5w, dry hole, TD 4,084½ ft., plugged to 4,060 ft. and acidized for show of oil—no results.

Huron County, Sherman Township: Shell Oil 1 A. Mitrovich, SE SE NE 31-15n-16e, dry hole, TD 2,350 ft.

Kalamazoo County, Alamo Township: Homer Fulton 1 Fron, SW SW SE 18-1s-12w, dry in Traverse limestone, TD 1,313½ ft.

Kent County, Caledonia Township: Smith Petroleum 1 Ralph Sherk et al, SE SE 21-5n-10w, dry hole, TD 5,200 ft.

Grattan Township: James J. McGerry, Tr., 1 Corrigan, SW SW SW 22-8n-9w, dry in Monroe formation, TD 2,930 ft.

Mecosta County, Colfax Township: Cities Service Oil 1 John Kotke, SE NE SE 23-15n-9w, dry hole, TD 1,732 ft.

Green Township: Cities Service Oil 1 Aaron Blum, SE NE SW 6-16n-10w, dry in Monroe formation, TD 3,740 ft.

Morton Township: Gulf Refining 1 Mary C. Gale, NW NE NE 3-14n-8w, dry hole, TD 4,820 ft.

Monroe County, Berlin Township: Joseph W. Sturman 1 Delmont and Rose Chapman, NE NE NW 29-5s-10e, dry hole, TD 3,377 ft.

Ottawa County, Olive Township: J. W. Lang Co. 1 H. Schutte, NW SW NW 26-6n-16w, dry hole, TD 715 ft.

Zeeland Township: J. E. Hood 1 Albert Walcott, SW SE SE 33-5n-14w, dry in Traverse limestone, TD 1,538 ft.

Washtenaw County, Sylvan Township: C. W. Collins 1 Joseph Merkel, Sec 22-2s-3e, dry, TD 1,850 ft.

EASTERN TEXAS

New Gas Discovery Made in Harrison County

DALLAS.—Rogers Lacy 1 Tutle, J. M. Clifton Survey, wildcat 4 miles north of Marshall, Harrison County, gaged 1,800,000 cu. ft. of gas in 24 hours on open flow on official test. Production is through casing perforations at 6,470-85 ft. and 6,515-23 ft. in the Pettit lime. Total depth is 7,030 ft. in the Travis Peak. Lacy will drill another wildcat in Harrison County 4 miles west of Marshall. It is 1 Hayman, E. Talley Survey, and will be drilled to 7,000 ft. to explore the Travis Peak.

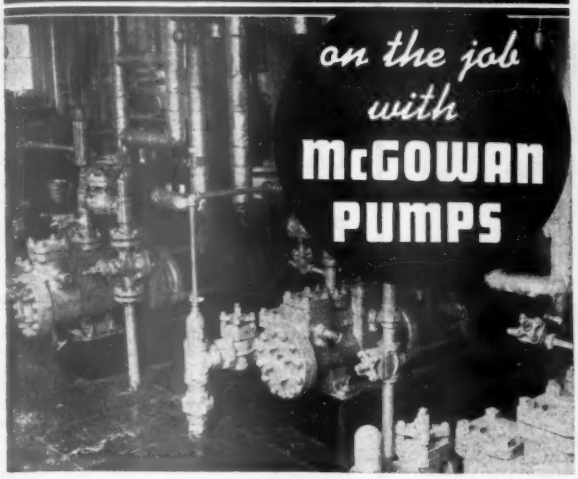
Smith County: Phillips Petroleum Co. 1 Hairston-Johnson, J. Hope Survey, South Tyler field, 2 miles northeast of Gresham, flowed 9½ bbl. of 45-gravity oil on a drill-stem test at 9,898-9,904 ft. Phillips 1 Carver, M. M. Long Survey, east offset to the discovery of the South Tyler field, was preparing to set casing after running electrical survey. Total depth is 9,998 ft. Phillips 1 Englander, Thomas Quevado Survey, a "tight" well 4 miles southwest of the South Tyler field, was drilling ahead at 12,496 ft. in sand and shale with no change reported. Sinclair Pairie Oil Co. 1 Schofner, William Dickerson Survey, Smackover test in the Chapel Hill field, cored at 12,094-104 ft. and recovered gray limestone with some porosity but no shows. It was drilling below 12,253 ft. in lime and shale.

The Carthage field, Panola County, had three completions this week. The district reported two field locations in Wood County, and one each in Marion, Panola and Robertson counties.

EASTERN TEXAS WILDCAT FAILURES

Navarro County: J. L. Collins & Co., 1

GASOLINE PLANTS AND REFINERIES



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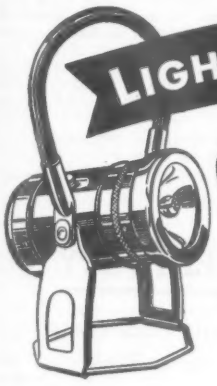

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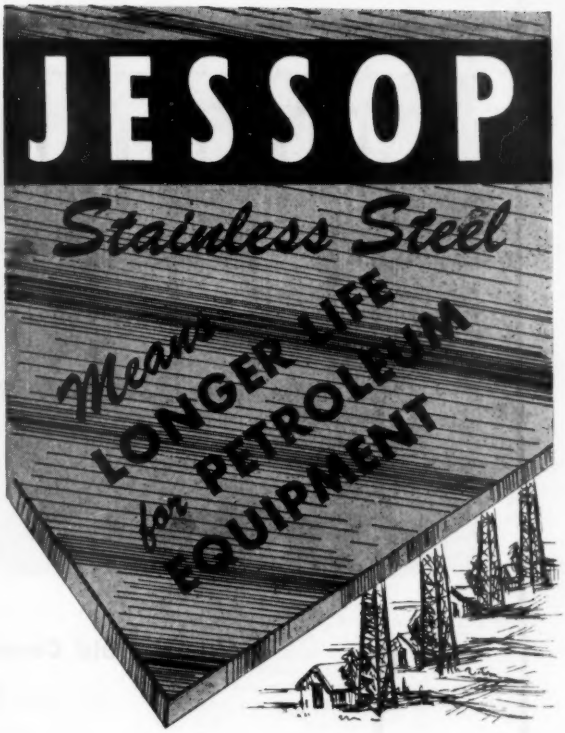

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TYPICAL ANALYSIS

C	Mn	Si	Cr	Ni	Cb
0.10 max.	2.00 max.	0.70 max.	17.00 - 20.00	8.00 - 12.00	10xC 1.25 max.

The use of columbium as a stabilizer in Jessop 18-8 Cb, which is a chromium-nickel stainless, prevents the formation of chromium carbides at grain boundaries and thus makes this alloy ideally suited for welding.

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TYPICAL ANALYSIS

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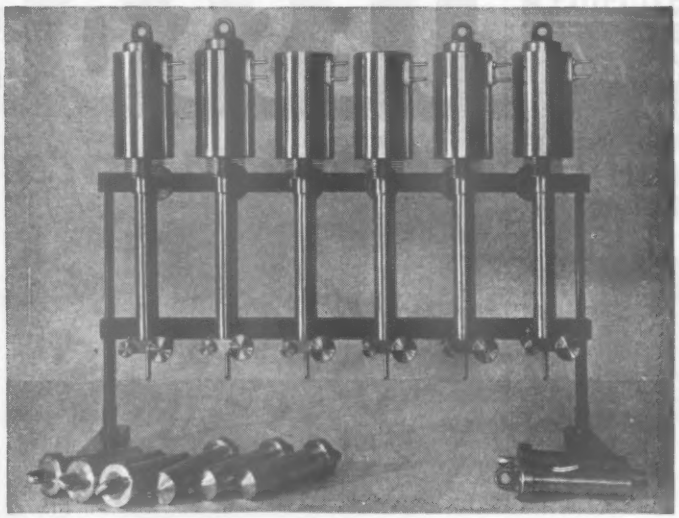

Above: Fluid Content Stills

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Rusk County: Tex-Harvey 1 S. N. Coleman, Mary Able Sur., 1 mi. SE Reklaw, elev. 332 ft., Austin chalk 4,130 ft., Woodbine 4,290 ft., dry, TD 4,338 ft.

LA.-ARK.

Possible Third Pool Seen For Richland

SHREVEPORT.—Halfway between the Delhi and the new Big Creek field, a flowing wildcat indicates a third pool for Richland Parish. R. J. Caraway 1 Bryant, SE NW 35-17n-8e, drilled to 3,220 ft., and perforated at 3,148-65 ft. The well flowed into pits from the perforations, with no gage taken. Operators have shut in the well for tankage.

Three-quarters of a mile southwest of the Big Creek field, another well has set pipe to test saturation. Bering Oil Co. 1 Price, in Section 5-16n-8e, bottomed at 3,100 ft., and will test the sand found at 2,941-62 ft., which showed the saturation.

In the Arkansas fields, a Ouachita County wildcat, McAlester Fuel Co. 1 Wesson, NE NE SW 24-15s-19w, showed oil at 2,646-76 ft. in Glen Rose, and had odor of oil at 2,860 ft. in James lime. Total depth of hole is 2,954 ft., and pipe was set to 2,878 ft. Operators will perforate.

Lake St. John pool led completions for North Louisiana with four, two oilers and two gas wells, one a new pay for the field. In the Arkansas fields, the Stephens pool added three oil wells.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Concordia Parish: New pay in Lake St. John pool—California 3 Brown, 1,699 ft. south and 2,967 ft. east of NW cor. of SW 46-9n-10e, 50,000,000 cu. ft. of gas from pay zone at 10,222-250 ft., TD 10,287 ft.

NORTH LOUISIANA WILDCAT FAILURE

Natchitoches Parish: J. H. Liles 1 Hertzog, 110-7n-6w, dry, TD 3,500 ft.

OHIO, KENTUCKY

Duncan Falls Pool Gets Good East Side Well

COLUMBUS.—The Duncan Falls pool in Muskingum County had another good well along the east side. B. G. Davis 1 B. L. Wilson, Section 20, Salt Creek Township, gaged 1,245,000 cu. ft. in the Clinton, found at 4,100-4,159 ft.

S. E. Large has staked a wildcat Clinton test in the northeast corner of Muskingum County on W. L. Sandel, Lot 17, Monroe Township. Carroll County, east of the Sandyville field, will have two deep tests. In Rose Township, Frank Lyons is drilling in on the Hickory Clay Products, Section 34, while Belden et al have a rig up on M. Stepkovic, Section 1, Brown Township. H. C. Bishop has started to drill a deep test on L. Seiberling, Lot 2, Wadsworth Township, Medina County. Snee & Eberly are drilling their 1 Humphrey, Section 34, Knox Township, Columbiana County, down to the Clinton, after finding water in the Oriskany.

Twenty-three locations were reported this week with 10 in the Ashland-Lorain

field. Of the 22 completions, the Brush Creek field led with 8.

OHIO WILDCAT FAILURE

Muskingum County, Falls Township: Ohio Fuel Gas 1 W. H. Evans, Lot 2, Clinton 3,547-3,572 ft., dry, TD 3,670 ft.

EASTERN KENTUCKY

ASHLAND.—Knott County came in for the bulk of completions during the week in the Eastern Kentucky fields.

Kentucky-West Virginia Gas Co. completed three wells, No. 5472 on the Robert Thacker property.

Henry Ball completed No. 24 on the Kate Sawyer property, Owl Hollow, Estill County, at a total depth of 296 ft., with an estimated production of 1 bbl. of oil.

Patterson, Dyer & Rader completed No. 1 on the Mirada Johnson property in Jackson County, depth unstated, estimated daily production of 15 bbl. of oil.

WESTERN KENTUCKY

OWENSBORO.—Twelve wells were reported completed in western Kentucky in the past week, including 8 oil wells and 4 dry holes. The oil wells averaged 170 bbl. per well in initial production. Only 1 wildcat, a failure, was reported.

WESTERN KENTUCKY WILDCAT FAILURE

Henderson County: Cherry & Kidd and C. E. O'Neil 1 T. J. Pritchett, 1½ mi. N of Robards, dry at 2,600 ft. Glen Dean 1,879 ft., Barlow lime 2,138 ft., Ste. Genevieve lime 2,466 ft., McClosky 2,536 ft.

INDIANA

EVANSVILLE.—No completions were reported from Indiana fields in the past week.

KANSAS

Ellis County Has New Pool West of Pleasant

THREE miles west of Pleasant pool in Ellis County, the B. & R. Drilling Co. is opening a new pool in its 1 Gabel, NW NW NW 5-14-20w. The Arbuckle was topped at 3,838 ft., and 5-in. pipe set. After drilling in to a total depth of 3,844 ft., the hole filled up with 2,300 ft. of oil in 12 hours. After acid, the well pumped 25 bbl. per hour for 2½ hours, and has been given a pump potential of 220 bbl. per day.

In trying to obtain fuel for plant operations, Beech Aircraft Corp. has opened a second gas supply in Kansas. The discovery well, Beech Aircraft 2 McCelland, SW SW NE 6-29-2e, produced an open flow of 11,250,000 cu. ft. per day from the Lansing at 2,220-40 ft. Location is 1 mile southwest of the old Derby gas field.

Completions for the week totaled 35, including 17 oilers, 2 gas wells, and 16 dry holes. Eight of the completions were wildcats, which included 2 oil wells and 1 gas well. Locations announced this week parallel the completions, with 33 new starts, including 7 wildcats. Wildcats are scheduled one each for Butler, Dickinson, Edwards, Phillips, Rooks, Russell and Saline counties.

KANSAS SUCCESSFUL WILDCATS

Sedgwick County: New oil pool—British-American 2 Petrie, NW SW SW 36-26-1w, pumped 417 bbl. from Viola at 3,387-90 ft., TD 3,392 ft., Mississippi lime 3,041 ft., Kinderhook 3,222 ft., Viola 3,387 ft.

Sheridan County: New oil pool—Continental et al 1 Hoxie State Bank, NE NE NE 32-8-26w, physical potential 280 bbl. of 38.6-gravity oil from Lansing at 3,758-3,832 ft., TD 4,323 ft., Mississippi lime 4,218 ft., Arbuckle 4,256 ft.

Wyandotte County: New gas pool—Kelley et al 1 Krohne, SW NW 6-10-23e, estimated 200,000 cu. ft. gas from sand at 1,040-1,107 ft., TD 1,750 ft., Hunton 1,573 ft., Viola 1,676 ft.

KANSAS WILDCAT FAILURES

Barton County: W. L. Hartman 1 Gaunt, SE SE NE 3-20-13w, dry, TD 3,476 ft., Arbuckle 3,445 ft.

Butler County: Zeigler et al 1 Teeter, NE NE SE 36-25-5e, dry, TD 2,750 ft., Mississippi lime 2,708 ft.

McPherson County: R. B. Hurbutt et al 1 Morrison, S/2 NW SE 12-18-1w, dry, TD 2,826 ft., Mississippi chat 2,806 ft.

Rooks County: Derby 1 Brown, S/2 SE NE 20-8-16w, dry, TD 3,393 ft., Arbuckle 3,373 ft.

Wallace County: Champlin 1 Sweisgood, SE SW NE 11-13-42w, dry, TD 5,541 ft., Arbuckle 5,490 ft.

MISSOURI WILDCAT FAILURE

Atchison County: Claude McQueen et al 1 Cloepfil & Ramsey, NE NE SW 30-65n-41w, dry, TD 1,500 ft., base Kansas City 915 ft.

ILLINOIS

More Dry Holes Than Oil Wells in Past Week

CENTRALIA.—Dry holes outnumbered oil wells in the past week's 34 completions in Illinois. Sixteen oil wells and 18 dry holes were recorded. The average initial production of the oil wells was 110 bbl. Four wildcat completions produced oil, resulting in new pools in Gallatin and Wayne counties, and the extension of the Bungay pool in Hamilton County and the Brownsville pool in White County. Seven wildcats in six counties were dry.

In Edwards County, in the Parkersburg pool, R. B. Martin and Central Pipe Line Co. 1 Gadeau, C N½ NW NE 6-1n-14w, an old McClosky lime well that had fallen off to 10 bbl. a day, swabbed 200 bbl. a day from Cypress sand at 2,846-61 ft., after pipe was milled out opposite the upper pay. Originally the well was a 1,000-bbl. producer completed in May 1942.

Two new oil pools, three extensions to pools, and one new pay in a pool were discovered in Illinois in August, according to the State Geological Survey. New pools are Ingraham West in Clay County, producing from the Cypress sand, and Huey in Clinton County, producing from the Benoist sand. Two extensions were completed to the Herald pool in White County and one to the Albion Consolidated pool in Edwards County. The new pay was the Rosiclare limestone in the Divide West pool in Jefferson County.

Most active pools during August were Bible Grove, Albion Consolidated, Clay City Consolidated, Boyd and Odin. Discovered just 1 year ago, the Boyd pool has shown a recent increase in activity and has become the most important pool discovered during 1944 with a total of 57 producing wells completed. Most promising of the 1945 discoveries to date is the Odin pool. Discovered in July, seven producers were completed in August. Initial productions averaged 100 to 200 bbl. from the Cypress sand.

New operations reported totaled 38, including the following wildcats: John Carlson et al 1 Orr-Fulkerson, SW SW NE 4-7s-9e, White County; William Cartmell et al 1 J. Tewell, NE NE SE 32-12n-7e, Coles County; National Associated Petroleum Co. 1 Bryan, SE SW NE 9-3n-2e, and George Engle 1 Varsell, SE SE NW 12-12n-3e, Marion County: Collins Bros. 1 C. Metzger, SW SE SW 29-1s-9e, Wayne County; The Texas Co. 1 Wiseman SE NE NW 15-2s-14w, Edwards County; H. H. Weinert, 1 McEwen, NW NW SE 3-6s-8e, White County.

ILLINOIS SUCCESSFUL WILDCATS

Hamilton County: Carter Oil 1-A Provident Mutual, NW NW SE 14-4s-7e, Aux Vases sand 3,286-3,309 ft., pumped 7 bbl. in 24 hours, TD 3,327 ft. Extends Bungay pool.

Gallatin County: Tom Ferrell 1 Oldham NE NE NW 24-9s-9e, an old wildcat worked over, TD 2,837 ft., PB to 2,662 ft. Aux Vases sand 2,648-62 ft. Pumped 19 bbl. oil and 6 bbl. water in 24 hours. Pool discovery.

Wayne County: Texas 1 A. Bowyer, SE SE NW 34-1s-5e, Aux Vases sand 2,974-81 ft. Pumped 41 bbl. of oil and 34 bbl. of water, TD 2,981 ft. Pool discovery.

White County: J. J. Lynn 1 and Pure Oil 1 J. A. Sillman, NW NW SE 36-5s-8e, Hardinsburg sand at 2,632-56 ft., not shot, pumped 131 bbl. of oil and 28 bbl. of water in 24 hours, TD 3,261 ft. Extends Brownsville pool.

ILLINOIS WILDCAT FAILURES

Franklin County: National Associated 1 Old Ben Coal, NW NE SE 16-5s-2e, dry at 2,848 ft. Menard 1,949 ft., Cypress 2,435 ft., Aux Vases 2,720 ft., McClosky 2,826 ft.

Jefferson County: Magnolia 1 O. H. Moss, NE SW NE 12-2s-2e, dry at 2,800 ft. Menard 1,928 ft., Cypress 2,372, Benoist 2,521 ft., Aux Vases 2,610 ft., Fredonia 2,695 ft.

Madison County: B. F. Thompson 1 J. C. Reynolds, NW NE NW 36-4n-6w, dry at 2,589 ft. Barlow lime 584 ft., Cypress 624 ft., Benoist 776 ft., Aux Vases 870 ft., Ste. Genevieve 950 ft., Osage 1,300 ft., Louisiana 1,816 ft., Devonian 1,898 ft., Maquoketa 2,402 ft., Trenton 2,589 ft.

Wayne County: H. Luttrell 1 Stofer, NW NW SE 22-2n-5e, dry at 2,999 ft. No log.

C. A. Lynch 1 Leach-Fuhrer, NE NW NE 34-2s-6e, dry at 3,467 ft. Menard 2,468 ft., Cypress 2,992 ft., Benoist 3,190 ft., Aux Vases 3,251 ft., McClosky 3,400 ft., St. Louis 3,462 ft.

Washington County: Inland Oil 1 Lichenfeld, SW SW SE 22-1s-3w, dry at 2,808 ft. Glen Dean 942 ft., Cypress 1,146 ft., Benoist 1,279 ft., Aux Vases 1,355 ft., McClosky lime 1,486 ft.

E. J. Ruwalt 1 Reichman, NE NW NW 1-2s-1w, dry at 2,239 ft. Glen Dean 1,394 ft. Benoist 1,810 ft., McClosky 2,014 ft., St. Louis 2,074 ft.

MISSISSIPPI

First Massive Sand Well Produces in Heidelberg

JACKSON.—The first producer from the Massive sand in the Heidelberg field is the Southport Petroleum Co. 2-A McDonald, 498 ft. north and 243 ft. east of SW corner of SE SW 26-1n-12e. Two unsuccessful tests were followed by squeeze jobs on perforations, and the third test recovered 5,940 ft. of oil in two hours, with ¼-in. chokes top and bottom. The well was swabbed, and then shut in. When opened, the well started flowing oil, but pressure dropped rapidly, and swabbing will probably be resumed.

Humble Oil & Refining Co. 1 Ball, 760 ft. south and 1,980 ft. east of NW corner of 20-2n-14e, in the Hub field of Marion County, has made a high ratio oil test in basal Tuscaloosa sand. Casing was perforated at 9,112-17 ft., in the top of the saturated zone, and with packer set at

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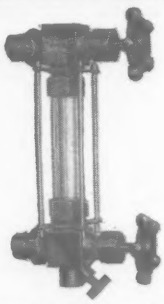

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9,030 ft., the well flowed at the rate of 149 bbl. of 42-gravity oil and 1,690,000 cu. ft. of gas through a ¾-in. tubing choke. When put on a 7/64-in. choke, the well flowed at the rate of 37 bbl. of 38-gravity oil and 410,000 cu. ft. of gas.

Seven new locations were announced this week, four of which were wildcats. New wildcats are scheduled one each for Adams, Issaquena, Stone and Washington counties.

ROCKY MOUNTAIN

Sheldon Dome Test Finds Embar Production

DENVER.—The Sheldon dome wildcat in Fremont County, Wyoming, reported a discovery in the Embar formation last week, a joint operation of Phillips Petroleum Co., Kerlyn Oil Co., and Carter Oil Co., which made 468.9 bbl. in 11 hours on an open flow test through the 2½-in. tubing. This was an average of 42.7 bbl. per hour. It then was tested through a ¼-in. choke and made 13½ bbl. per hour. Gas ratio was 250 cu. ft. to the barrel of oil. The crude is a sweet oil with practically no sulfur testing 36.2-gravity at 70°. The well is on Indian land in the Wind River reservation in NE NE 16-5n-2w.

Oil show at Maudlin Gulch.—Frontier Refining Co. 1 Unit, NE NW NW 35-4n-95w, Maudlin Gulch structure, Moffat County, Colorado, 7 miles northwest of the Wilson Creek oil field, gave promise of opening a new pool when 240 ft. of high-gravity crude was recovered in a drill-stem test at 6,286-97 ft., open 32 minutes. However, a less favorable showing resulted from a test at 6,297-6,313 ft., open 20 minutes, in which 620 ft. of oil-cut water was encountered. An electric survey of the hole is being made to determine whether the oil came from the Morrison or Sundance horizons.

Rangely extension swabs 190 bbl.—Wasatch Oil Refining Co.-Newton Oil Co. 2-D Gentry, CSL SW NE 3-1n-102w, Rangely field, Rio Blanco County, Colorado, which is the first Weber sand well drilled south of the river and which will mean a ¾-mile extension of the proven area, swabbed at the rate of 190 bbl. per day, but did not flow. It will be shot.

Baxter Basin discovery.—Transcal Petroleum Corp. 1 Union Pacific, NE SE 11-19n-104, North Baxter Basin gas field, Sweetwater County, Wyoming, a test to the Weber (Tensleep) which stopped upon encountering oil in the Nuggett sand at 4,135 ft., total depth, was tested after setting the 7-in. at 4,123 ft. First 24 hours on 28/64-in. choke it flowed 88 bbl. oil and 69 bbl. of water; second 24 hours, 96.5 bbl. oil and 157 bbl. water; third 24 hours, 77.2 bbl. oil and 157 bbl. water. Fourth 24 hours choke was changed to 14/16-in. and well flowed 80 bbl. oil and 105 bbl. water. It was then shut in. Gravity of crude is 43.6°.

New operations.—Nine new operations were reported, of which three are wildcats and six development wells. Latter included two in Cut Bank and one each in Kevin-Sunburst, Oil Springs, Frannie and Kutz Canyon.

Completions.—Eighteen wells were completed with initial production of 2,112 bbl. of these 70 were development wells with an initial production of 1,640 bbl., including 1 each in Gebo and Garland, 5 in Cut Bank and 3 in Kevin-Sunburst. Eight were wildcats, of which six were dry, one an extension of the Winkelman field and one a discovery in North Baxter Basin.

COLORADO WILDCAT FAILURE
Moffat County, Maybelle: Stanolind 1 Blue, SE SW SW 35-6n-96w, TD 3,890 ft., top of Madison 3,415 ft., Dakota and Sundance formations missing, dry.

WYOMING SUCCESSFUL WILDCATS
Fremont County, Winkelman: Extension to old oil pool—Stanolind 7 Tribal, SW SW SE 18-2n-1w, TD 3,373 ft., top Tensleep 3,090 ft., swabbed 16 bbl. oil per hour from Tensleep. Extension on east side.

Sweetwater County, North Baxter Basin: Oil discovery in gas field—Transcal Petroleum Co. 1 Union Pacific, NE SE 11-19n-104w, TD 4,135 ft., top Entrada (Nuggett) 3,855 ft., 7-in. 4,123 ft., flowed 88 bbl. oil and 60 bbl. water first 24 hours through 28/64-in. choke, with 11,500,000 cu. ft. of gas.

WYOMING WILDCAT FAILURE
Carbon County, Arlington: Wasatch Oil Refining 1 Dixon, SW NE NE 23-19n-78w, TD 5,390 ft., dry, tested Sundance.

(Continued on page 147)

OKLAHOMA

Ilco's 1 Allred Is Best Well in Cheyarha Pool

THE old Seminole area in Oklahoma came back into some prominence in the past week. Ilco Oil Co. has the best well thus far completed in the Cheyarha pool. Its 1 Allred, NW NE NW 8-9n-7e, flowed 38 bbl. per hour through ½-in choke from Booch sand at 3,580-3,612 ft., total depth 3,632 ft.

The Texas Co. 1 Arundel, C SE NE SW 2-15n-1w, in the Evansville area in Logan County, was finally completed in the Bartlesville sand flowing 114 bbl. in 24 hours through 20/64-in. choke from pay topped at 5,234 ft. Both Wilcox zones, topped at 5,805 ft. and 5,890 ft. were dry. Total depth was 5,925 ft. Flow was from perforations at 5,231 to 5,243 ft.

Three miles northeast of Britton, in Oklahoma County, Ace Gutowsky 1 C. T. Crum, NW NW SE 24-13n-3w, total depth 6,945 ft. was plugged back and Cleveland sand at 5,723½-31 ft. tested through perforations. The well pumped off in 14 hours with a production of 31 bbl. and a little water.

In the West Moore field in Cleveland County, the south offset to the discovery well was dry and abandoned. It is Mid-Continent Petroleum Corp. 1. E. W. Harris, NE NE NW 32-10n-3w, which found Wilcox sand at 8,830-42 ft. barren of oil. Owner plugged back to Hunton lime at 8,010-60 ft. and the well produced 28 bbl. per hour through 1 in. tubing choke but production fell off to a very low figure. A retainer was set above the Hunton and pipe perforated opposite the Burgess (Bartlesville sand) at 7,750-90 ft., but no production was found.

Southeast of the Liberty field in Noble County Ed J. Kubat et al made a drill-stem test in 1 Ramsey, NW SW NW 11-22n-2e, in Wilcox sand at 4,420-37 ft. In 1 hour 60 ft. of oil and 200 ft. of mud were recovered.

In Garvin County Magnolia Petroleum Co. was testing a wildcat, 1 Butterfly, NW SW SE 14-1n-1e, which showed for about 40 bbl. a day from the Arbuckle lime at a total depth of 4,423 ft. After retainer plug was set and pipe perforated in the Oil Creek zone at 3,818-29 ft., a drill-stem test developed 1,500 ft. of fluid. Then swabbing was started.

OKLAHOMA SUCCESSFUL WILDCAT
Osage County: New oil pool—A. G. Oliphant No. 3, SE NW 21-28n-11e, pumped 35 bbl. of oil from Peru at 1,356-80 ft., TD 1,520 ft.

OKLAHOMA WILDCAT FAILURES
Atoka County: Ed Kubat 1 Gudgel, SE

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NE NW 15-3s-9e, dry, TD 2,780 ft., McLish 2,005 ft.

Comanche County: Stephens Petroleum 1 Goering, NE NE NE 23-3n-10w, dry, TD 2,013 ft., in sand.

Logan County: F. C. Hall 1 Perdue, SE SE SW 24-19n-4w, dry, TD 4,882 ft., lower Layton 4,853 ft.

Davon 1 Herron, NE NW 16-17n-4w, dry, TD 5,121 ft., Layton 5,096 ft.

Pontotoc County: Allied Oil 1 Miller, SE SW SW 28-3n-8e, dry, TD 3,770 ft., Sylvan 3,470 ft.

Seminole County: Big Chief and Vickers 1 Mathis, SW SW NW 24-6n-6e, dry, TD 2,907 ft., Cromwell 2,850 ft.

CALIFORNIA

Ohio Squeezing Off Water on Gardena Well

LOS ANGELES.—Ohio Oil Co. has pulled tubing in its discovery well at Gardena in Los Angeles Basin and is making a squeeze job to exclude water which has shown up in increasing quantities during the past several days. The water shutoff on the 7-in. casing was approved unconditionally, prior to the production test but apparently failed subsequent to completion of the well, necessitating some remedial work.

General Petroleum Corp. extended the northern limits of the Paloma field this week by completing 36-28 Benco in Section 28-31s-26e, flowing 790 bbl. daily from the Paloma sand at 11,290 ft., and in doing so has added about 100 acres to the field's total.

Standard Oil Co. of California has resumed drilling operations in the Leffingwell wildcat, located about midway between the Santa Fe Springs and West Coyote fields and the hole is being cored solidly. The company landed 7-in. casing at 10,145 ft. several days ago and the resumption of drilling was somewhat of a surprise as a production test was anticipated of the oil sand reliably reported to have been found. Standard is withholding data on this test until it is completed.

CALIFORNIA WILDCAT FAILURES

Imperial County, El Centro: Amerada 1 Timken, 28-16s-14e, bottomed in gray sand and shale of undetermined age, no showings, TD 7,323 ft.

Kern County, Midway-Sunset: Richfield 1 Smith & Crawford, 3-31s-22e, bottomed in Maricopa brown shale, form. test 6,824-7,000 ft. recovered salt water, TD 7,000 ft., dry.

North Edison: Standard 45-21 Edison, 21-29s-29e, bottomed in basement, Edison shale 1,695 ft., Olcese sand 2,665 ft., Jewett sand 4,192 ft., Pyramid Hills sand 4,358 ft., bentonite 4,484 ft., Vedder sand 4,493 ft., top basement 4,975 ft., TD 5,004 ft., dry.

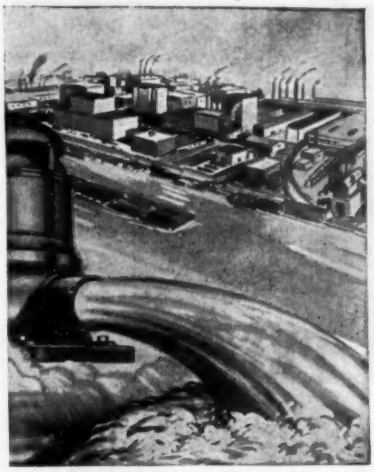
Round Mountain: Independent Exploration 1 fee, 36-27s-28e, bottomed in gray sand, Vedder sand of Miocene age was barren at 1,225 ft., TD 1,239 ft.

Temblor Hills: Richfield and Sun 1 Gonyer Unit, 34-12n-25w, bottomed in hard gray sand, only minor showings logged from grass roots, TD 6,500 ft.

Los Angeles County, Lincoln Park: Dumm Bros. Petroleum 15 Olympic, 24-1s-13w, bottomed in sand that showed a little heavy oil, pumped only water, TD 1,259 ft.

Newhall: Signal Oil & Gas 1 Needham, 13-3n-16w, bottomed in hard gray sand of low permeability, steep dips in bottom, form. test negative, TD 4,998 ft.

Merced County, Gustine: Tide Water Associated 31-36 Soares, 36-8s-8e, bottomed in hard gray sand, ran electric log, no test justified, TD 5,509 ft.



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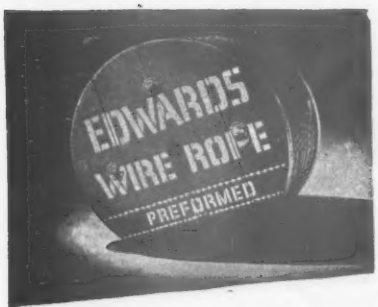

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Among the Drilling Contractors

Hoover Drilling Co. of Bakersfield, Calif., has drilled a total of 33 new wells for the Navy Department at Elk Hills in rapid succession and without losing a hole or suffering any great delay because of mechanical troubles.

Kingwood Oil Co. has moved in rig and is preparing to spud on its 1 Rucker, NE NE NE 35-15n-8w, in Washington County, Mississippi.

Gene Reid Drilling Co., California drilling contractor, has taken a contract to drill a new well for B. & R. Oil Co. in the McVan area of Kern County, California, in Section 14-27s-27e and an early spud will be made.

Andrew S. Hoyt will drill the P. K. Degenther 1 William Ash, NE NW NE 14-4n-16w, a wildcat in Allegan County, Michigan.

Drilling Contractors, Ltd., of Calgary, Alta., have the contract for a joint test by Imperial Oil and Anglo-Canadian Oil Co., in the Dog Pound-Crossfield area of Alberta, immediately north of Calgary. Location has been made in LSD 9, 11-28-2w5, following extensive seismographic work.

Lester Drilling Co. has the contract to drill the Gulf Refining Co. 27 Stanley, in the Eucutta field of Wayne County, Mississippi.

C. E. Mills, of Lloydminster, Sask., has finished Ponalta 1, LSD 8, 12-49-1w4 in the Alberta section of the Lloydminster field. The test was carried to completion at 1881½ ft. in 6 days drilling, and commercial production is indicated.

Ralph Perry has been awarded the contract to drill the S. L. McCall 1 David J. Clark, SE NE NW 1-2n-14w, a wildcat in Allegan County, Michigan.

Snyder & Head, of Calgary, Alta., have finished a difficult fishing job clearing the Pekisko Hills 1 well, LSD 6, 6-17-2w5 to resume drilling from 4,480 ft. The drilling firm has contract with Highwood-Sarcee Oils of Calgary to deepen the hole, standing for 9 years, to test the Devonian limestone, and is rigging rotary equipment for deepening.

Higginbotham - King Drilling Co. has the contract to drill the Raymond M. Whyte 1 Frank McSpaddin et al, NE NW NW 34-19n-5e, a wildcat test in Arenac County, Michigan.

Merrill Drilling Co. is the contractor for two Deep River pool locations in Arenac County, Michigan. They are the Fletcher & Leman 2 Martha Smith, NW SE SE 15-19n-4e, and the National Associated Petroleum Co. 1 John Augustyn, NW SW NE 27-19n-4e.

K & K Drilling Co., of Vermilion, Alta., is preparing to test Edgerton Oils 2, LSD 3, 20-43-4w4 in the Edgerton district south and west of the

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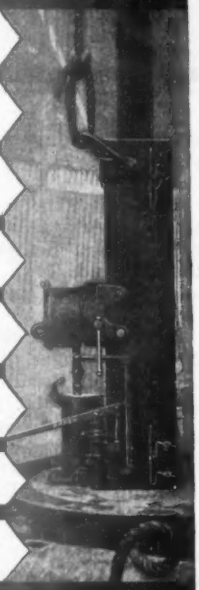

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Lloydminster field. Test was cemented at 2,689 ft. The same contractors are drilling Edgerton 3, LSD 9, 18-43-4w4.

American Drilling Co. will drill the Michigan Oil Co. 1 Ernest O. Herzberg, SW SW SW 7-19n-4e, a Deep River pool location in Arenac County, Michigan.

Basin Oil Co. will drill the W. L. McClanahan 1 State-Moffat, SW SE NE 35-20n-3e, a wildcat in Arenac County, Michigan.

Union Drilling & Producing Co., Mt. Pleasant, Mich., will drill its 1 Raymond F. ConGley, SW NE SE 23-16n-6w, in the Coldwater pool of Isabella County, Michigan.

Rine Drilling Co. has the contract to drill the Atlantic Refining Co. 1 Schmidt, SE SE SW 25-24n-5w, a Wilcox sand test in Garfield County, Oklahoma.

Harris Oil Co. has contract for S. L. McCall 1 Masie Wolven, SW NE SW 25-9n-11w, in the Rockford pool of Kent County, Michigan.

Strom Oil Co. will drill the Byron MacCallum 1 Edward C. and Alice M. Green, N/2 SW NW 27-10n-12w, a wildcat in Kent County, Michigan.

Graham Wilcox has the contract for Clarence Wilcox 1 Robert Taylor, NW NW NE 20-9n-10e, a wildcat in Lapeer County, Michigan.

Rocky Mountain Area

(Continued from page 144)

NORTHWEST NEW MEXICO WILDCAT FAILURES

San Juan County, Aztec: Southern Union Production 1 Thompson, SE SW 33-31n-12w, TD 2,368 ft., dry in Picture Cliff.

Shiprock Dyke: Continental 1 Shiprock, 6,270 ft. S and 10,890 ft. W of SW cor. 31-29n-18w, TD 1,510, top Morrison, 1,490 ft., top Dakota 1,340 ft., dry.

Santa Fe County, Alamos: Paul B. English 1 Fullerton, SE NW 16-15n-10e, TD 3,220 ft. in granite, dry.

Spiess: Richfield Oil 1 Federal-University, SE NW NW 25-14n-11e, TD 2,600 ft., dry in granite.

CALENDAR

October

American Association of Oil Well Drilling Contractors, Oklahoma City, October 1-2.

I.P.A.A., annual membership meeting, Tulsa, October 15, 16 and 17.

American Gas Association, annual meeting, Engineering Societies Building, New York, October 24.

1946

April

Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas, April 17-19.

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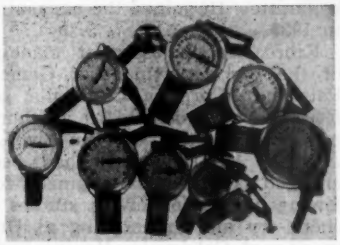

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PERSONALS

Always Interested In C. N. G. A.'s Progress

THE new vice president of California Natural Gasoline Association, M. W. Kibre, was chosen to fill that post because he always has evinced a lively interest in the organization's progress. He has served as chairman of its technical committee and fall meeting committee and as a member of its charcoal test committee. He joined the association in 1929.

Kibre, who is assistant manager of the gas department of General Petroleum Corp. of California, entered the oil business as a laboratory man for that company in Los Angeles. He previously had been engaged as a chemical engineer, following completion of his studies in chemistry and engineering at University of California. He was promoted to chemist for General Petroleum and later was transferred to Vernon as an engineer in the gas department.

In 1943 Kibre became superintendent of the department, in January 1944 general superintendent, and recently was advanced to his present position.

Ronald D. Gibbs, who has been assistant to the executive vice president of Union Oil Co. of California, has been elected a vice president and will maintain offices at the headquarters in Los Angeles.

Dr. Donald Babcock Keyes, director of the office of production, research, and development of War Production Board and head of the chemical engineering division of University of Illinois, has been elected to receive the Honor Scroll of American Institute of Chemists, awarded annually for outstanding contributions in chemistry or chemical engineering. Dr. Keyes, who was on leave from the university during the war, graduated from University of New Hampshire in 1913 with the degree of bachelor of science. He received the Master of Arts degree from Columbia University the following year, and Ph. D. from University of California in 1917.

Pierre Freymond, geologist, has arrived in Maracaibo, Venezuela. He was transferred from Diadema Argentina, at Buenos Aires, to Caribbean Petroleum Co., Caracas, Venezuela.

Joseph C. Thorstenberg, formerly technologist for Continental Oil Co. at Ponca City, Okla., has joined the research department of Skelly Oil Co. at Pawhuska, Okla.

Lt. Col. Albert B. Stevens has returned to College Station, Tex., to begin a 60-day leave, after which he will be released from the Army. Colonel Stevens is on leave from Texas A. & M., where he was professor of petroleum engineering. He has been a member of the faculty since 1934. Called to active duty in January 1942, Colonel Stevens went overseas in March 1944. Assigned to the military pipe-line service, he was named chief of the construction branch, his principal task being to furnish engineering supervision in the laying of pipe lines supplying petroleum to the armed forces.

Dr. Philip G. Murdoch, for many years associated with Shell Oil Co., Inc., has been appointed professor of chemical engineering at Texas A. & M. College. He will conduct graduate courses and research.

John Herasinchuk has been promoted from district engineer to acting superintendent for Atlantic Refining Co. at Punto Corda, Venezuela, succeeding **James Hall,** who resigned.

Lewis Kellett, formerly pilot in the U. S. Army Air Forces, with the rank of first lieutenant, has joined the Midland, Tex., office of Amerada Petroleum Corp. as a scout.

John A. McCutchin, for the past 2 years manager of the production division of British American Oil Co., Ltd., at Calgary, Alta., has resigned to join Sohio Petroleum Corp. as manager of its Illinois-Indiana division, with headquarters in Mount Vernon, Ill.

Lt. Col. Michel T. Halbouty, consulting geologist and petroleum engineer, has been returned to the inactive list and will resume his consulting work in Houston, with subsidiary offices in New Orleans and Louisville. In Washington Halbouty was chief of the petroleum production division, planning division, in the Army-Navy petroleum board under the joint chiefs of staff.

George L. Parkhurst, contract executive in the refining division of Petroleum Administration for War, and **T. J. Byrne, Jr.,** assistant director of refining, have resigned these posts. Parkhurst will leave Washington October 31 to resume his former position with Oronite Chemical Co., subsidiary of Standard Oil Co. of California, in San Francisco. Byrne has gone back to Standard Oil Development Co. as assistant chief process engineer.

R. C. Stoner has been elected chairman of the board of Richmond Petroleum Co. of California. **Norman Hardy** was elected president. Richmond, a Standard Oil of California subsidiary, is engaged in exploratory work in Venezuela and Colombia.

Torrey H. Webb, Los Angeles, vice president of The Texas Co., California division, and Dorothy Kimball Stewart, New York, were married September 2 at Boulder City, Nev.

J. L. Hoyt, Jr., who was district production foreman in the Willamar field, Willacy County, Texas, for Pan American Production Co., has been advanced to superintendent of the company's Valley division. His headquarters will remain in the Wil-

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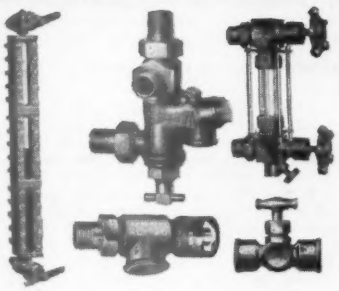

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lacy field. Hoyt graduated in petroleum engineering from Louisiana State University. He replaces **D. H. Emerson,** who left the oil business to operate his ranch near San Marcos, Tex.

David L. Gordon, for several years in charge of the Houston office of Anchor Petroleum Co., has been elected a vice president of company, which has its principal offices in Tulsa. Gordon will remain in Houston, where, before joining Anchor, he was president of Refiners Export Co.

Robert W. Young has resumed his position as field-service representative of Pennsylvania Grade Crude Oil Association, with headquarters in Cleveland. Young was eastern representative of the association from 1939 to 1943, when he resigned to take an assignment in war work at Bedford, Ohio.

Douglas Hastings, formerly a member of Standard Oil Co. of California's engineering staff at Coalinga, has been transferred to the company's 11-C camp at Taft to succeed **Bert Ellis,** who was moved to Elk Hills.

James S. Meriwether Shell Oil Co., Inc., president of Midland Oil Scouts Association, was chairman of the committee which supervised construction of the association's building in Midland, Tex., just completed and now in use. Members of the committee were **Paul R. Martin,** Pure Oil Co.; **A. A. Jones,** The Atlantic Refining Co., and **Orville L. McNew,** Amerada Petroleum Corp. The building, erected at a cost of $8,500, contains a large meeting room for the scouts. The rest of the space is devoted to a sample cut. Money for the project was advanced by oil companies, and it is to be paid back from revenues obtained through the sample cut and other activities of the organization. **H. L. Straughan, Sr.,** is manager of the sample cut.

Maj. John C. Young, a graduate of Stanford University in geology and petroleum engineering and before the war a member of the California Conservation Committee, has returned home after 31 months in the China-Burma theater. He hopes to be discharged from the Ordnance Corps within 60 days, and he plans to enter the oil business this time as a producer in California.

Paul E. Kuhl, formerly assistant manager of the southern East Coast refineries for Standard Oil Co. of New Jersey, has been named manager, succeeding the late Merle R. Meacham.

ORBIT VALVES

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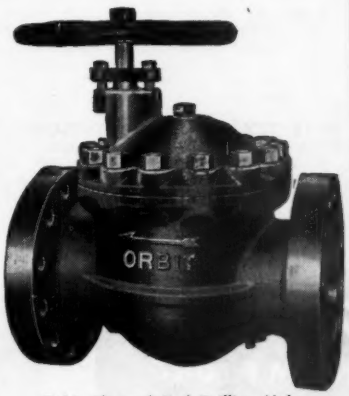

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See pages 2194 to 2211 in 1944 Composite Catalog

ORBIT VALVE COMPANY
TULSA, OKLAHOMA

Permian Basin

(Continued from page 139)

hours and pumped off. It is now shut in. Total depth is 5,063 ft. Magnolia Petroleum Co. 1-B Tucker, Section 25, Block 1, H&TC Survey, 26 miles northwest of the McKee pool, Crane County, perforated casing with 60 shots at 5,796-5,806 ft. The test was shut in for 12 hours. It then flowed 17½ bbl. of oil in 44 minutes and died. Operator is preparing to swab. Total depth is 5,817 ft.

The Fullerton field, Andrews County, reported four completions this week, while Todd Deep field, Crockett County, Garza field, Garza County, and Ownby field, Yoakum County, each had two. The Fullerton field had six new locations, Wasson field, Yoakum County, had three and Waddell field, Crane County, had two.

WEST TEXAS SUCCESSFUL WILDCATS

Andrews County: New oil pool—Magnolia 1 E. P. Cowden, Sec. 7, Block A-55, PSL Sur., 1½ mi. E and 2½ mi. N of SW cor. county, elev. 3,135 ft., Devonian 7,778 ft., top pay 7,900 ft., flowed 244 bbl. day through ⅜-in. choke on 2-in. tubing, perf. 7,900-60 Devonian, gravity 38.2°, gas-oil ratio 2,681, TD 8,051 ft.

Hockley County: Extension to old oil pool—Texas 1-B W. T. Coble, Lab. 19, Leag. 67, Hardeman CSL, W extension to Levelland pool, elev. 3,626 ft., San Andres 3,850 ft., pumped 21 bbl. day through 2-in., perf. 4,733-4,829 San Andres, gravity 29.7°, gas-oil ratio 586, TD 4,870 ft.

WEST TEXAS WILDCAT FAILURES

Borden County: Northern Ordnance 1 Clayton & Johnson, Sec. 32, Blk. 31, T-4-N, T&P Sur., 7½ mi. SW Gail, elev. 2,481 ft., Ellenburger 9,450 ft., dry, TD 9,499 ft.

Lubbock County: Geo. P. Livermore and Honolulu 1 C. C. Debusk and Mrs. Marie Eastman, Sec. 38, Blk. D-7, C&MRR Sur., adjoining town of Idalou, elev. 3,202 ft., Tubb 5,860 ft., Cravens 5,938 ft., dry, TD 5,978 ft.

Pecos County: J. L. Cooper 1 Iowa Realty Trust, Sec. 61, Blk. 10, H&GN Sur., 7 mi. SW Buena Vista, elev. 2,489 ft., Yates 1,143 ft., dry, TD 1,570 ft.

Yoakum County: Gulf 1 F. W. Frost, Sec. 35, Blk. D, John H. Gibson Sur., 13 mi. N Plains, elev. 3,772 ft., San Andres 4,410 ft., dry, TD 5,209 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Phillips Petroleum Co. 4 Lea-Mex, 17-17s-37e, deep test in the Maljamar field of west central Lea County and the deepest test yet drilled in New Mexico, is dry at 13,998 ft. in shale. The test was drilled "tight" except for reports on drilling depths. It was indicated that markers will be released soon. Elevation is 4,312 ft. Vickers Petroleum Corp. has reported 1 State-Shell, 17-21s-34e, wildcat 3 miles west and south of Eunice, as dry after showing hole full of water at 4,100-16 ft., total depth.

Eddy and Lea counties each reported three field completions. Lea County had seven new field locations, while Eddy County had two.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURES

Eddy County: Malco Refineries 1 State, 16-19s-27e, elev. 3,405 ft., Grayburg 1,275 ft., dry, TD 2,003 ft.

Lea County: Texas 1 Eaves, 26-16s-38e, 14 mi. N Hobbs, elev. 3,967 ft., Glorietta 6,365 ft., Tubb 7,395 ft., dry, TD 10,085 ft.

Roosevelt County: Hill & Taylor 1-X Caudell, 22-2s-30e, elev. 4,573 ft., Yates 2,166 ft., dry, TD 3,378 ft.

Texas Gulf Coast

(Continued from page 140)

all of them below the level currently being tested.

There were nine new locations reported this week with three being wildcats, one each in Chambers, Fayette, and Lavaca counties. Of the 14 completions 2 are successful wildcats, 1 each in Colorado and Brazoria counties, with 3 dry wildcats, 1 each in Harris, Matagorda, and Tyler counties. Harris County led with three completions, with Brazoria and Galveston counties each having two.

UPPER GULF COAST SUCCESSFUL WILDCATS

Brazoria County: New oil sand, Blue Lake field—Glenn H. McCarthy 1 T. J. McMillan estate, Geo. Robinson Sur., Abstract 126, top sand 8,996 ft., TD 9,044 ft., perf. 9,000-08 ft., PT 238.35 bbl. daily through 9/64-in. choke, gas-oil ratio 450, tubing pressure 825 lb., gravity 30.4°, trace of water.

Colorado County: New oil pool—Skelly and Warren Petroleum 1 R. Hamel estate, Richard Dowdy Sur., 9 mi. SW Columbus, TD 9,706 ft., per. 9,052-69 ft. in Wilcox, PT 194.63 bbl. per day through a 3/16-in. choke, gas-oil ratio 6,878, tubing pressure 2,100 lb., gravity 46.3°, no water.

UPPER GULF COAST WILDCAT FAILURES

Harris County: A. T. McDannald and Jack W. Frazier 1 B. F. Louis, Almeda area, N. B. Waters Sur., Abstract 872, dry at 6,020 ft.

Matagorda County: Humble 1 J. J. LeTulle, Lake Austin area, I&GN Sur., 9 mi. SE Wadsworth, dry at 7,310 ft.

Tyler County: General Crude Oil 1 G. C. Mettauer, in G&BN Co. Sur., Abstract 311, 5 mi. E Rockland, dry at 3,515 ft.

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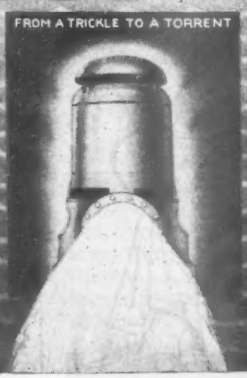

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